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## ORIGINAL ARTICLES.

### INTESTINAL INDIGESTION (DYSTRYPSIA).\*

BY JOHN C. HEMMETER, PH.D., M.D., ETC.,  
OF BALTIMORE, MD.;

PROFESSOR IN THE MEDICAL DEPARTMENT, UNIVERSITY OF MARY-  
LAND; DIRECTOR OF THE CLINICAL LABORATORY, ETC.

As I UNDERSTOOD your President, I was to give not an exhaustive report, but a critical and instructive summing up of that which is of clinical significance and of practical importance concerning Dystrypsia, and to present this as conceived through personal critical experience.

We are living in a period in the history of medicine in which the experimental tendency has gained supremacy over speculative philosophy in medicine. But we are in the possession of such an enormous amount of new material and facts, which by additional experiments is daily increasing, that the new facts frequently must be allowed to remain unused and are, for the time being, of no assistance in the advancement of our science. In this connection I must again repeat what I have emphasized in the preface of the second volume of my work on "Diseases of the Intestines," namely, the difference between *truth* and mere *facts*. These two are often, unfortunately, considered synonymous. Facts are little truths that our senses are capable, for the present, of comprehending, but back of and beyond these facts later experience often reveals the higher and greater truth. An experimental fact which to-day seems absolutely disconnected and therefore without meaning, may to-morrow, when viewed in another light, suddenly assume a far-reaching significance and importance. No new fact of experience, be it at present apparently ever so remote from practical understanding, need be considered worthless—provided it is correct. It may be allowed to rest as raw material for a time, but it is probable that in another association, it may acquire an importance which we did not anticipate.

But this I must emphasize, that an isolated, disconnected fact of experience or experiment, has for the time being no significance for the progress of medicine. This significance comes only then when we can arrange and fix this fact into the already existing and firmly established architecture of our knowledge. There exists a danger in overrating the value of single facts of experience and experiment. Individual facts discovered this way are accumulating to such an extent that we are completely submerged under an ocean of experimental results, and the intellectual interpretation which fits them into the synthetic structure of our science is missing.

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Physicians who are not participants in experimental undertaking, feel this absence of the connecting links between an enormous number of new acquisitions very painfully, which, though experimental, are in a sense empirical. This is also true of the experimental acquisitions in bacteriological as well as biochemical domains. In the eighteenth and during the first part of the nineteenth centuries medicine was comparable to a sterile unproductive heath, in which some evil spirit drove about the speculative medical philosophers in a circle. Now we have gotten into an overfruitful swamp or jungle in which the facts grow so luxuriantly that they threaten to smother our thinking powers. The tendency of all new laboratories is to bring out new facts. Let us have all of them if it must be, but what we need as much, if not more than new facts, are master minds who will instruct us in the interpretation of these facts, and give them a meaning and value by fitting them into the synthetic structure of medicine. Martius (Pathogenese innerer Krankheiten) compares modern medicine to a sense-confusing concert, and what is needed is a disciplinarian to instruct us concerning the leading "*motives*," to seek the familiar law in the revealed wonders of the present time.

"Sucht das vertraute Gesetz in des Zufalls grausenden  
Wundern,  
Sucht den ruhenden Pol in der Erscheinungen Flucht."  
—Schiller.

Alexander von Humboldt, in his monumental work "Kosmos," describes the condition of the mind in one to whom a promised land of research of any kind has opened itself, in a very beautiful manner. The following are his words: "It is a custom of those who would like to conduct others to the summit of mountains, to describe the path as pleasanter and easier as it will be found in reality. It is their habit to praise the glorious views from the mountains, even though they may divine that large portions of the regions below may be concealed in fog. They know also that in this concealment there is a mysterious charm and that in a hazy perspective distance the impression of infinity will be made reflecting in a serious and divining manner in the mind and in the sentiments." And I may add that this feeling of mysterious charm will in the right kind of a mind elicit the desire of a closer acquaintance with that region seemingly so far away; and this is about the conception that I have of the sentiments with which an investigator should approach the solution of difficult problems of any kind. The stimulation which comes from everything that is new and understood makes us put up with many a stony path and much hard work, in seeking further knowledge. In connection with the accumulation of single facts

of experience and experiment in medicine, the correlation of which with our general knowledge of already established truths has not yet taken place, Humboldt says: "It is a safe criterion of the quantity and quality of the discoveries which we may expect in any science, when the facts seem yet to stand isolated and without relation to another." The great plethora of experimental results, therefore, is rather to be interpreted as a good sign, only we will have to be cautious not to regard in the light of a law what is in reality only a recent acquisition standing, as a rule, in very loose relation or having no connection at all with the synthetic structure of medical knowledge.

Our main efforts in diagnosis will as a rule be directed to separate the intestinal neuroses from bowel diseases with a distinct anatomical substratum. The most frequent of the latter are the various types of enteritis. In acute enteritis of the jejunum and ileum most important objective evidences are found in abnormal condition of stools, mostly diarrheic and thick like gruel—characteristic features are (1) shreds of *mucus* intimately admixed with the fecal matter, (2) *bile pigments*, (3) *epithelia and muscle fibers* stained with bile. If stool is solid a *test lavage of colon* should be made to differentiate catarrh of small from that of large intestine; if the lavage water brings out large connected shreds of mucus or membranes or masses of glassy mucus, we have a colitis. We may have an enteritis at the same time, but this cannot be definitely established if the colitis is certainly present. Enteritis running its course with obstipation has no characteristic subjective symptoms. The objective signs are bile pigments, the constant presence of abundant muscle fibers and well-recognizable starch cells, and of fat in form of oil droplets, fatty acid crystals or soaps. The exact localization of catarrh of the small intestine is practically impossible.

*Dyspeptic Diarrhea in Connection with Stomach Diseases.*—In the gastric condition known as achylia gastrica—complete loss or suppression of gastric secretion (HCl and ferments)—we may encounter severe diarrheas, during which the subjective gastric symptoms are completely submerged under the clinical picture of what looks like acute enteritis. This occurs also in the abnormality of gastric secretion which I have first called attention to and designated as "*Heterochylia*" (from *ἕτερος*, meaning "other," or different, varying, and *χολός*, meaning juice). (See Hemmeter, "Diseases of the Stomach," third edition, p. 870.) For the recognition of this dyspeptic diarrhea test-meal analysis is indispensable, and stool examination necessary. The gastric peristalsis is unimpaired as a rule, but chymification absent entirely. The feces show unchanged residue of meat, connective tissue, especially vegetable foods and even fat residues. The work of Pawlow has shown conclusively that the gastric HCl is the most essential stimulation to the formation of pancreatic juice. In his masterly research

Pawlow discovered a new enzyme in gastric secretion—a specific ferment—chymaze, which does not digest food, but which accelerates the action of the ferments of the pancreatic secretion. The digestive tract is not universally and uniformly irritable or stimulatable by every mechanical, chemical, thermic or dietetic agent, but there is a specific irritability and a specific reaction with regard to the peculiarity of every individual digestive demand or duty. There is a most artistic digestive mechanism of digestion revealed by Pawlow's work, which in its sublime fineness, preciseness and accuracy and inner adaptiveness to utility and purpose exceeds any new discovery of modern physiology. If you want to feel proud of being a physician, if you wish to feel the ennobling consciousness and enthusiasm that comes from successful, hard and earnest work, from difficulties overcome, read Pawlow's "*Die Arbeit der Verdauungsdrüsen*."

The most efficient means of counteracting dyspepsia due to pancreatic insufficiency is to bring about a healthy appetite. Appetite is the stimulus to normal gastric secretion, and this in turn the normal stimulant to healthy pancreatic secretion.

Although an article on intestinal dyspepsia is not the proper place to consider the newer gastric physiology, a brief reference to recent discoveries is indispensable—not simply because the stomach is the preparatory organ for intestinal digestion, but also because the chemical processes which various food-articles undergo in the stomach are of far-reaching importance for the changes which are to occur in these foods after they reach the intestines. Many of the older authors, beginning with the American physiologist Beaumont, believe that the mechanical irritation of the foods cause the gastric secretion, but the experiments in Pawlow's laboratory have proved the fallacy of this view. In the first place, if the secretion were due to simple mechanical irritation, there is no reason why irritation with the point of a glass rod, with a feather, or with sand placed in the stomach, should not cause the secretion also. The mistake of the older experimenters, according to Pawlow, grew out of the fact that they ignored the so-called psychic secretion—a secretion which can be set up by the mere smell of food, or even by a very intense feeling of hunger. If the esophagus of a dog is cut, and its end sewed to the edges of an abdominal wound, and at the same time a gastric fistula is established, pieces of meat which are fed to the dog after healing of these fistulae, will not reach the stomach, but fall out of the upper end of the fistula leading into the esophagus. Nevertheless in five or six minutes after swallowing the food gastric juice begins to be secreted, running from the gastric canula first in drops and afterward in a continuous stream. If the dog be offered meat without receiving it, the gastric secretion will also appear, though not so plentifully as when the dog was actually allowed to eat the meat. A further interesting phenomenon observed on these dogs was that no secretion followed the swallow-



ing indigestible substances like small stones. These experiments furthermore elicited the astounding fact that for every kind of food a definite gastric secretion is formed of specific composition. Therefore we can say that the stomach provides a certain chemical agent to meet each case. We must therefore conclude that the mucous membrane of the stomach is capable of distinguishing between the varieties and classes of food that come in contact with it, much as the skin recognizes mechanical, chemical, thermic and electrical stimulation. The question might be asked "What is the object of this psychic secretion?" for Pawlow has clearly established the existence of two kinds of gastric secretion, the chemic and the psychic. This question applied to the human physiology would be the same as inquiring "What is the object of appetite?" The answer is that under the influence of the psychic secretion a gastric juice is furnished which is much more effective than that which is secreted under purely chemical stimulation of the food, *i.e.*, when food is taken without any special appetite. Furthermore, under the influence of psychic secretion foods which otherwise would not stimulate the gastric mucosa to secretion become converted by the already present psychic secretion into something else which constitutes a further stimulant to the secretion of gastric juice. For instance, if a solution of albumin be administered to a dog upon which a Pawlow operation has been performed, (*i.e.*, splitting off part of the stomach, with all the vessels and nerves intact, and making this second smaller stomach communicate with the external abdominal wall, but not with the general cavity of the large stomach from which it is dissected (See International Clinics, XII series, Vol. II, p. 276)—there will be no secretion from the small stomach, for albumin by itself does not excite chemical secretion. But if the psychic secretion is set up by some other means, before the albumin is placed in the large stomach—for instance, by waving a piece of meat before the dog's eyes—then following the introduction of albumin, a secretion will be found in the small stomach which is qualitatively and quantitatively greater than the psychic secretion alone, or when albumin is given alone it is evident that while albumin in itself does not excite secretion, the products of albumin do cause this secretion. The same is true of pieces of bread which when placed in the large stomach through the fistula will not promote a secretion, but if the dog is allowed to swallow the bread, secretion commences and continues for several hours. Psychic secretion, therefore, is a preparatory secretion, transforming substances which would otherwise not stimulate the stomach, into such conditions which can accomplish this stimulation. The fact that bread will cause a secretion when chewed and swallowed and not when placed directly in the stomach through the fistula, may be interpreted (as Pawlow and Peter Borisoff do), as proving the secretion of a gastric juice under psychic influence but—as I will show pres-

ently—it may be due to a special ferment in the saliva that stimulates gastric secretion.

Further revelations from Pawlow's laboratory disclose very important relations between the various classes of food, permitting the conclusion that they may mutually advance or interfere with the digestion of their various constituents in the gastric chyme. For instance, starch paste does not by itself promote gastric secretion, but when mixed with meat it was found to accelerate the action of the gastric juice, increasing its digestive power. On the other hand the addition of fat to a meat diet diminished the quantity of gastric secretion as well as its digestive power. Furthermore, it was demonstrated that the stomach is capable of distinguishing between lactic, butyric and hydrochloric acids, and responded to each of these acids with a varying quantitative secretion. As lactic and butyric acids are products of gastric fermentation, their stimulating influence on gastric secretion is of therapeutic importance. It is evident therefore that the stomach is extremely delicate in detecting not only the composition of foods and regulating the composition of its secretion correspondingly, but that it can distinguish between various organic acids. These experiments furthermore gave the clue to the treatment of gastric secretory disorders not by drugs merely, but by dietetic measures.

I have dwelt upon these results because disordered gastric digestion is, in my opinion, very often the cause of intestinal dyspepsia. By these gastric disorders I do not necessarily mean the organic diseases of the stomach (gastritis, ulcers, etc.), but simply the improper composition of the diet causing abnormal chemical formations in the chyme; and as a healthy gastric digestion is a necessary precursor to a normal pancreatic secretion and duodenal digestion, a reference to these results requires no apology. Referring once more to the new gastric ferment "chymaze," which does not digest food but accelerates the action of the pancreatic ferments, it may interest you to learn that I have discovered in normal saliva a ferment which, if added to digesting mixtures of gastric juice, accelerates the digestive power of the gastric secretion. In other words, this new salivary ferment will effect a more rapid conversion of proteid into the albumoses and peptones, a quicker solution of boiled egg albumin and of fibrin, than would occur without it. I have proposed the name "*salivary secretion*" for this gland stimulating ferment. A new and wonderful field for work is herewith unlocked to those medical practitioners who are conscious of the aims they wish to attain. Not only is normal duodenal dependent upon normal gastric digestion, but normal gastric digestion is in turn dependent upon normal buccal or oral digestion. What an admirable mutual interdependence, correlation and interaction; illustrating in a most subtle scientific way Shakespeare's saying:

"May good digestion wait on appetite, and health on both."

Therefore if we are desirous of having a normal intestinal digestion let us above all things see that the mouth and the stomach are in good condition.

It will be impossible within the limits of this report to dwell fully upon all the various conditions which may bring about dystrypsia. I will limit myself to a more especial consideration of those forms due to qualitative and quantitative abnormalities in the diet. Abnormal digestion may take place either exclusively in the albuminous foods or the carbohydrate foods. If there is a qualitative unhygienic mixture of the diet, causing an excess of the carbohydrates, a most frequent form, the various bacteria and fungi will cause an excessive fermentation of the carbohydrates with the formation of organic acids, particularly of acetic and lactic acids. This organic acidity of the duodenal and jejunal chyme may become so great that the action of the digestive juices, the pancreatic juice and the bile, will be interfered with, for especially the pancreatic juice requires a certain degree of alkalinity for its action. I have in previous publications advocated the restriction of the word "fermentation" to the bacterial decomposition of the carbohydrates, and the limitation of the word "putrefaction" to the bacterial decomposition of the proteid and albuminous food. (See "Diseases of the Intestines," Hemmeter, Vol. I.) This form of intestinal fermentation of the carbohydrates is one of the most frequent causes of infantile diarrheas, in which there is in many cases no material change in the mucosa of the intestine; and it may give rise to certain characteristic symptoms, which have hitherto been most carefully studied in children. Most prominent among these symptoms are diarrhetic discharges, anorexia, acid eructations, and vomiting of acid masses. The abnormal peristalsis is due to the irritations by the excessive organic acid, especially acetic acid. The fermentation begins in the jejunum, and the hyperperistalsis begins there also. Successive parts of the small intestine are involved in the hyperperistalsis, and consequently the jejunal contents are hurried through the entire small intestine with a great velocity. When such an attack of fermentative dystrypsia begins, the first evacuations represent the contents of the lower bowel, and as a rule presents nothing characteristic, but these first stools once evacuated, the following stools are highly characteristic and have given the whole clinical picture the name of *jejunal diarrhea*. The recognition of these stools depends upon our familiarity with the condition of the normal jejunal chyme. We will have to bear in mind that the contents of the jejunum are normally very rich in mucin, and that the jejunal chyme is physiologically gelatinous as if a thick, tough, glassy liquid had been stirred into the macerated food. Inasmuch as an abundant presence of mucus in the stool is correctly attributable to pathologic catarrhal changes in the intestinal wall, we are compelled to seek for other evidence to decide between what

is (1) a jejunal stool with its physiologic admixture of mucus, simply present in that apparently abnormal amount because it is rapidly hurried through the entire intestinal canal, and (2) what may be a catarrhal stool dependent upon enteritis. The distinguishing features for a catarrhal stool are the presence of epithelia and round cells derived from the mucous membrane which are absent in the jejunal stool. The jejunal stool is very rich in bile pigment, has only a slight fecal odor, is generally of an acid reaction. By these features it will be possible to distinguish between the jejunal and the catarrhal stool. The dystrypsia due to carbohydrate fermentation which thus gives rise to the jejunal diarrhea, is important also because in adults as well as in children it may eventuate in actual catarrh of the mucosa or enteritis. The anamnesis indicating an excessive carbohydrate ingestion, and the examination of the stools showing unusual amounts of undigested starch by Lugol's solution, will clinch the diagnosis. In my laboratory starch is at times not found by Lugol's solution, not even in abnormal stools, where we would expect to find it. I cannot believe that the starch is digested in such cases, but think it is decomposed by fermentation for the fermentative products of starch are abundantly present in such stools. Van Ledden Hülsebosch (Makro. u. mikroskopische Diagnostik der menschlichen Excremente, 1899), however, claims to have found starch in his stools, within and without starch-containing plant cells every time he ate potatoes. Nothnagel's experience led him to look upon the presence of starch in isolated granules as well as in fragments, in the feces as pathologic if these could be found quite abundantly.

It is therefore not an easy matter to decide between what is normal and abnormal quantitatively and qualitatively concerning the presence of starch in the feces. Unfortunately for the exactness of their observations, Hülsebosch and others did not state how much starch was ingested when they observed it in the feces. Evidently starch diet can in the normal individual be so far augmented as to make undigested starch appear in the feces. Then again, the process of cooking will have a marked influence on this phenomenon. Raw or only partially cooked starch will leave a greater undigested residue than boiled starch. We have no right to expect the intestines of the human being to digest raw starch completely. Starch occurring within cellulose membranes has no diagnostic importance. Only the starch which occurs in isolated paste-like residues is significant. In the normal individual no or very few such isolated starch residues can be found on a diet containing a medium amount of carbohydrates. If such residues are abundant—they signify an intestinal disturbance—and it is a well-known fact that such residues are not abundant except in stools of a thin consistence, this in itself pointing to an abnormality. The seat of such starch dystrypsia is the small intestine—for the stomach and colon are not di-



rectly and actively concerned in amylolysis. And as starch is the most readily digestible substance in our diet the appearance of an abundance of starch residues in the stool, as a rule, points to a severe digestive disorder, if the cases are chronic, the acute fermentative dystrypsia of adults excepted. In chronic persistent cases it is my custom to exclude all starch from the diet and in allowing it to grant only such amounts as will be completely digested, as shown by fermentative test of feces and staining with Lugol's solution of iodine. If the feces give a marked primary fermentation, according to Adolf Schmidt's test, I exclude starch. Such is my custom based on an abundant experience and it has never caused me to regret the restriction. I do not, by this admission of the value of Schmidt's fermentation, desire to be understood that I accept his method as infallible, but I do not believe that the feces should normally give an intense, immediate fermentation, for this is due either to carbohydrates or to their products. Microscopical examination of stained preparations of the feces will permit of reliable deductions, and this method is more applicable to practice. Normally Lugol's solution should show no blue color in the stool.

*Remnants of Meat Fibers.*—An abundance of undigested muscle fibers after a weighed test diet (See Ad. Schmidt u. J. Strasburger, *Die Faeces des Menschen*, S. 4 and 5) is always significant of abnormal intestinal digestion and if the nuclei in the muscle fibers are very evident it signifies abnormality of the secretion of the pancreas (insufficiency of the pancreas). The treatment of course will in the first place have to regard the diet, for in the great majority of such cases as a rule nothing further is necessary. Similarly if the dystrypsia is due to excessive proteid ingestion, an exclusion of this class of foods will be necessary. But a decision to which of these two classes the dystrypsia is assignable is not always to be arrived at promptly and surely. Here clinical experience and macroscopic and microscopic examination of the feces are telling factors. In either case total abstinence from food is one of the most effective means of treatment, especially if it follows an evacuation of the entire intestinal canal effected by the old and established remedies, of which there are still none more practical than calomel and castor oil. I have rarely found intestinal disinfection necessary in such cases, if the diet regulations were faithfully carried out.

So the presence of an abnormal amount of muscle fibers in the stool indicates a disturbance of intestinal digestion in the broadest sense, it does not enable us to precisely define the character of this intestinal dystrypsia, or to localize it. If the nuclei are well preserved in the muscle fibers found in the stool, we are justified in the conclusion that the function of the pancreas is insufficient, because the pancreatic secretion is the only one which can digest the nuclei of muscle fibers, but extensive putrefactive processes in the colon can also effect nuclear solution. There-

fore it is only the positive finding of preserved nuclei that permits of an exact deduction.

*Presence of Connective Tissue.*—As the pancreatic secretion is incapable of digesting the connective tissue in unboiled meat, the presence of an excessive amount of undigested connective tissue fibers when scraped raw beef has been eaten, justifies us in the conclusion that the gastric digestion is imperfect. Therefore the presence of an excessive amount of connective tissue points to abnormal gastric digestion, and not to an intestinal disturbance.

*Fat.*—The appearance of droplets of neutral fat and of fatty crystals is pathological, but the appearance of fat in form of soaps has no diagnostic significance.

We have therefore in the preceding abstracted the diagnostic significance of the appearance of starch, muscle fiber, connective tissue fibers, fats, fatty acids and soaps, in the feces, and these comprise practically all food remains that permit of diagnostic deductions.

*Treatment.*—(1) The diet. In the author's experience it is impossible to succeed with a radical enforcing of strict diet of any kind, but it is wise to recommend what is known as a bland diet; above all things, to study the stools, if possible by the microscope and stool-sieve, in order to discover what foods pass the intestinal tract undigested. These must, thereupon, be avoided, or given in so finely divided a state and in such small quantities that their digestion becomes easier. It is also of importance to utilize the observations which the patients have made upon themselves with regard to the diet. They frequently know what causes distress and what can be digested. The stool examination, however, will guard against deception. The author makes it a rule to forbid alcohol, tea, coffee, and tobacco to these patients. In great exhaustion he allows small quantities of a superior wine or whisky, under strictest control. In some patients a diet rich in carbohydrates, in others one rich in proteids (beef, fowl, fish), is well digested. In fact the diet to be followed can not be decided until a dietetic experiment is made. (2) The same holds good with regard to the treatment of the constipation. Here the practitioner will have to decide whether this is due to atony or spasm of the intestinal musculature, for what will benefit one condition will harm the other. Here, also, in most cases, a therapeutic experiment will be necessary before we can discover whether we are confronted with atony or spasm. The majority of these patients require exercise after meals. A few that are weak may require rest in bed. Especial attention must be paid in the selection of the food for the last meal of the day. Great moderation in the amount eaten and the digestibility are the most important points to bear in mind. A heavy supper will often produce a restless night. (3) The treatment of the general neurasthenia will be that by electricity, hydrotherapy, massage and baths. Insomnia demands attention and often yields to efforts direct-

ed to cleaning the colon and stomach. Hypnotics must be avoided as long as possible.

Whenever a dystrypsia has existed for a considerable time on a purely functional basis, it may eventuate in a disease with definite anatomical alterations. One of the most common symptoms is augmented intestinal peristalsis as a result of irritation by fermentative masses. A condition results in which the contents of the upper part of the bowel are hurried through the entire intestine in an unaltered condition—i.e., the stools may present the same properties as are characteristic of the contents of the jejunum, which are normally thick, but liquid and gelatinous. When there is excessive bacterial activity, the various intestinal antiseptics have been advocated. Personally the author has been able to get along without them in the great majority of cases. He has seen very grave results follow the administration of the irritant antiseptics. Perhaps the most available are bismuth salicylate and subgallate, betanaphthol bismuth, thymol, menthol, resorcin and salol. Creosote, even in small doses, has, in the author's experience, deranged the stomach in sufferers from dystrypsias. In cases in which the gastric secretion of HCl was suppressed, he made a trial with the orexin so strongly recommended by Penzoldt, and noted in three cases an irritative diarrhea which became manifest after the first two doses, and ceased when the remedy was discontinued.

The following formulas have been used in a large number of cases by the author, for the special symptoms of intestinal dystrypsia.

The first one has proved useful in the putrefactive diarrheas, especially when associated with abdominal pain:

B	Tannigen .....	4.00 gm.	(1 dram)
	Bismuth subgallate..	8.00 "	(2 drams)
	Salol .....	1.55 "	(24 grains)
	Denarcotized extract of opium.....	0.20 "	(3 grains).

This can either be made into twelve capsules or prescribed with six ounces of some elixir, of which the author prefers the elixir of gentian and the essence of calisaya (P. D. & Co.), three ounces of each, in doses of a tablespoonful three or four times a day.

The author's favorite recipe for anorexia from gastric hypochylia in intestinal dystrypsia is the following:

B	Strychnine sulph. ...	0.02 gm.	( $\frac{1}{2}$ grain)
	Dil. hydrochloric acid	15.00 "	( $\frac{1}{2}$ ounce)
	Fluid ext.condurango	45.00 "	( $1\frac{1}{2}$ ounces)
	Elixir of gentian.....	180.00 "	(6 ounces).

M. Sig.: One-half of a fluidounce in two ounces of water. one-half hour before meals, through a glass tube.

The dilute HCl cannot be given in sufficiently large quantity to completely replace the normal secretion if this is absent entirely. Its function is merely that of a gastric and pancreatic stimulant in these doses.

Or:

B	Tinct. of nux vom..	9.30 gm.	(2 $\frac{1}{2}$ drams)
	Essentia calisayæ (P. D. & Co.).....	60.00 "	(2 ounces)
	Elixir of gentian.....	180.00 "	(6 ounces).

M. Sig.: One-half of a fluid ounce thrice daily, one-half hour before meals.

When there are evidences of anemia with the gastric hypochylia, the following acts satisfactorily:

B	Quin. sulph. ....	1.16 gm.	(18 grains)
	Strychnine sulph....	0.02 "	( $\frac{1}{2}$ grain)
	Sulphate of iron....	0.80 "	(12 grains)
	Arsenious acid.....	0.012 "	( $\frac{1}{2}$ grain).

M. Sig.: Make into twelve pills. One pill three times daily. They must be prepared fresh and not coated.

Boas uses the following powder for anorexia:

B	Ext. of nux vom....	0.024 gm.	( $\frac{3}{8}$ grain)
	Bismuth subcarbon..	0.520 "	(8 grains).

M. Sig.: Make twenty powders. One powder three times daily.

Menche has warmly recommended resorcin sublimate, and it undeniably improves the appetite in cases of incipient gastric and intestinal fermentation. It has also a slight sedative action. The following is Menche's formula:

B	Resorcin resub. ....	2 gm.	(30 grains)
	Tinct. of rhubarb.....	15 c.c.	( $\frac{1}{2}$ ounce)
	Simple elixir, enough to make .....	90 "	(3 ounces).

M. Sig.: A tablespoonful twice daily.

Resorcin can also be advantageously combined with bismuth salicylate, salol, and betanaphthol in the following manner:

B	Resorcin resub.....	5 gm.	(75 grains)
	Bismuth salicylate, Powdered rhubarb, Sodium sulphate, of each	10 "	(150 grains)
	Milk-sugar .....	15 "	(225 grains).

M. Sig.: An even teaspoonful twice to three times daily.

If dystryptic diarrhea is present the rhubarb and sodium sulphate must be replaced by calcium phosphate and calcium carbonate, of each 25 grams.

The following formulas are recommended by Ewald for anorexia with fermentation:

B	Tinct. of nux vom..	22.56 gm.	(6 drams)
	Resorcin resub.....	5.40 "	(83 grains)
	Tinct. amar. ....	11.25 "	(3 drams).

M. Sig.: Take ten to fifteen drops every two hours.

B	Fluid ext.condurango	17.00 gm.	(4 $\frac{1}{2}$ drams)
	Resorcin resub.....	4.00 "	(1 dram)

M. Sig.: Thirty drops four times daily.

In all cases of intestinal dystrypsia the aim must be to understand the cause and remove it. Not to give medicines except as an "ultima ratio."



# A BRIEF REVIEW OF SOME OF THE ETIOLOGICAL FACTORS IN INTESTINAL DYSPEPSIA.\*

BY E. FRANKLIN SMITH, M.D.,  
OF NEW YORK;

MEMBER OF THE AMERICAN MEDICAL ASSOCIATION, NEW YORK  
STATE AND COUNTY MEDICAL ASSOCIATION; DELEGATE TO  
NEW YORK STATE MEDICAL SOCIETY; MEMBER NEW YORK  
COUNTY MEDICAL SOCIETY; FELLOW NEW YORK  
ACADEMY OF MEDICINE, MEDICAL ASSOCIATION  
OF THE GREATER NEW YORK, ETC.

An established principle, or axiom, in the application of remedies, or remedial agents, in the treatment of disease is that the causative factor should first be determined. The importance of this cannot be overestimated, and until more exact knowledge is given us with regard to the physiology of digestion very little that is definite can be given you. The fields of physiology, physiological chemistry and bacteriology are now being so well worked that we can feel assured that our knowledge of the physiology of digestion will be greatly added to within a short time. Our almost entire lack of definite knowledge of the causes of intestinal dyspepsia is well shown after a review of the extensive literature that has been written on this subject and which I have reviewed thoroughly. As the result of my survey I am compelled to agree with Ewald, who, after speaking of secretion, absorption and motion, says: "It is an unpleasant fact that we know very little about the trio."

I have adopted the classification<sup>1</sup> of our honored guest of this evening, Dr. Hemmeter, not only because of its high merit, but also because of my appreciation of the work that he has done in this particular field.

Intestinal dyspepsia may be due to (1) abnormalities of secretion; (2) abnormalities of absorption; (3) abnormalities of peristalsis.

**Predisposing Factors.**—(1) Age. Intestinal dyspepsia may occur at any age, but it is more commonly met with between the thirtieth and fortieth year and before the age of ten; (2) Sex. It is found more frequently in the male sex on account of more frequent eating and overfeeding; (3) Heredity. This is supposed to play a very important part in the production of this disease, and it is occasionally found that several members of one family will have the same idiosyncrasy regarding a certain article of diet; (4) Previous attacks predispose to others; (5) Occupation. Persons engaged in prolonged mental labor, or who are overburdened with the grave responsibilities of business, or who sympathize too much with the distresses of others, are all very prone to suffer from this disease. The influence of the mind upon the intestinal is even greater than that upon the gastric indigestion. Again, such occupations as horse-shoeing, tailoring and other trades in which the body is bent forward may cause a local anemia and perverted secretion.

**Exciting Causes.**—Following Hemmeter's classification I shall divide them under nine headings, as follows:

I. *Intestinal Dyspepsia, Due to Pathologico-Anatomical Alterations of the Intestinal Walls, Nerves, Lymphatics, or Blood Vessels.*—Diseases or injuries of the small intestines may be accompanied by dyspepsia if the lesion deprive the mucous lining of its power of absorption, and under this heading we may include enteritis, enterocolitis, ulcers, neoplasms, obstructions, deformities either congenital or acquired, displacements, such as enteroptosis, or prolapse of other viscera constituting splanchnoptosis. B. Stiller<sup>2</sup> says that the variety of enteroptosis which accompanies nervous dyspepsias is always of neurasthenic origin. On the other hand, Herzog<sup>3</sup> states that nervous dyspepsia may be the result of an enteroptosis, but not the cause of it. He does not believe that the *maladie de Glénard* belongs to this category of nervous dyspepsias, nor is it a variety of this affection.

II. *Absence or Deficiency of the Intestinal Digestive Secretions, Especially of Bile and Pancreatic Juice.*—The importance of this subdivision can be well understood when the statement has been made that it has been estimated that the juices secreted during digestion in a man weighing 140 pounds amounts to 23 pounds in twenty-four hours. Intestinal digestion may be disturbed by abnormalities in the three main secretions (1) succus entericus, or intestinal juice; (2) the bile; (3) the pancreatic juice.

(1) *The Succus Entericus.*—So little is known in regard to the intestinal juice that no satisfactory explanation as to how abnormalities of this secretion affect digestion has thus far been given. It is supposed, however, to play a very insignificant part in the digestive process.

(2) *The Bile.*—Just what rôle the bile plays in the digestive process has always been a matter of much discussion, some claiming that it takes a very important and essential part, while others claim that it is simply an excretion. Experiments have shown though that if we take an animal and feed it a given quantity of fat, fat will not appear in the feces; now, if the bile is prevented from reaching the intestines and the same quantity of fat be fed the animal, fat will appear in the feces. We know that in jaundice there is a reduction of fat absorption. Physiologists have wondered why carnivorous animals should possess gall-bladders and why most herbivorous animals are without them. Clinically it has been shown that the gall-bladder is not an essential organ as it often has been found to be obliterated or destroyed after death and yet, during life, no bad symptoms were observed. The continual emptying of bile into the intestines seems to be a perverted process and what effect that has upon intestinal digestion is still a question. (a) *Polycholia.*—Ether, chloroform, arsenuretted hydrogen, phosphorus and olive oil, or any poison which will injure the red blood cells, will cause an increase in the bile-pigment. In such instances the hemoglobin is liberated from the erythrocytes and changed to bilirubin by the hepatic

\*Read before the Section on General Medicine, New York Academy of Medicine, December 16, 1902.

cells. (b) *Acholia*.—A lessened production of bile may occur from causes which diminish the size of the liver, as after resection, from hunger, febrile diseases and uremia. The production of bile may be reduced by certain chemical agents, among which may be mentioned iodide of potassium, calomel, atropin, strychnine in poisonous doses, and alcohol. Again a lessened amount of bile reaches the intestines when there is any obstruction by gall-stones, chololithiasis, catarrhal icterus, neoplasms or floating kidney which may press upon the common gall-duct. When there is a lack of the normal quantity of bile it loses its antiseptic action, and there is a stagnation of the bowel contents from a lack of the purgative action of the bile, and we then note increased fermentation with the development of irritating products which cause intestinal dyspepsia. Sometimes the bile may contain toxic substances which may irritate the duodenum and lead to catarrh of the mucous membrane and even to ulceration.

(3) *The Pancreatic Juice*.—Under this heading we may consider: (a) *Succorrrhea pancreatica*.—A reflex pancreatic secretion may be increased by any irritation of the lingual nerve, or of the central end of the vagus. *Pilocarpine* will do the same thing. (b) *Hypochylia* and *achylia pancreatica*.—A diminution, or absence, of the pancreatic secretion may be due to partial or general atrophy of the gland structure. Diminished secretion may be due to nervous influences; it may occur in anemic conditions, in subnutrition, and in general weakening of the organism; again, it may be due to certain chemical substances, such as atropin and toxic doses of strychnin; it may also be due to febrile disturbances. Carcinomatous or other malignant disease of the pancreas is attended with a lessening of the amount of pancreatic juice. Chewing tobacco, and to a less extent, smoking, are causes of a deficiency or altered pancreatic secretion.

III. *Intestinal Indigestion Due to Qualitative, or Quantitative Irregularities of Diet*.—Under this head we have three subtypes: (1) The diet is excessive in quantity and cannot be transformed in a normal manner by the amount of digestive secretions present. (2) Although normal in quantity it may be irregularly and unhealthfully mixed; there may be an excess of fat, or proteid, or carbohydrates, as the case may be. Overeating is a very frequent cause of intestinal dyspepsia if the food is not completely digested, as this permits the multiplication of germs. If too much starch is taken it interferes with gastric digestion of the proteids and the food ferments in the stomach and produces lactic and butyric acids in sufficient quantity to destroy the intestinal ferments. (3) Abnormal and injurious substances may be contained in the diet, either in the form of toxins, the result of putrefaction and fermentation in the food itself, or chemical substances that may have been added by accident or design for therapeutic reasons. It is well known that many chemicals and medi-

cines taken for the relief, or cure, of gastro-intestinal diseases exert a deleterious effect upon the normal course of digestion. The imprudent use of drugs, especially laxatives, may cause intestinal dyspepsia. Many drugs that are given to relieve supposed indigestion and dyspepsia are actually the causes of them. Condiments, particularly pepper, mustard and ginger, bromides, salicylate of sodium, all astringents, the salts of bismuth, iron when not given immediately after a meal, belladonna, bicarbonate of sodium, hydrochloric acid and pepsin, and many others may be the means of causing or increasing intestinal dyspepsia. Often hydrochloric acid is administered when the stomach is forming an excess of it.

Certain articles of food may give rise to intestinal dyspepsia; among these may be mentioned fruits, green corn, cucumbers, turnips, sour milk, decomposing eggs, fish, meat and sausages. Again certain combinations, such as milk and beer, sour milk and cucumbers, ice-cream and cucumbers, or cider and sour beer, are frequent causes. It has justly been assumed that poisonous organic bases, the ptomaines, perform an essential part in these cases. Many have already been determined, such as the tyrotoxin, lactotoxin and dimethylamin.

Gases that are formed in fermenting food, carbon dioxid, sulphuretted hydrogen and methane, increase peristalsis; so also do the acid products of fermentation, such as lactic, butyric, acetic, caproic and formic acids.

Errors of diet, food or drink that is qualitative or quantitative abnormal, are frequent causes. In the ingestion of abnormal quantities of food and drink the walls of the intestines are excessively distended and so act as a mechanical irritant; or else, the ingesta remain longer than usual since the secretion does not suffice to digest them; therefore, they become the subject of fermentation, the products of which irritate the intestinal wall.

IV. *Intestinal Dyspepsia Due to Abnormal Bacterial Activity*.—A very large number of the cases of diarrheas and dyspepsias occurring in children depend upon fermentation and putrefaction within the gastro-intestinal tract and without being dependent upon any solution of continuity in the mucous membrane. Bacteria are not essential to good digestion and health as was first expressed by Pasteur, although Busch<sup>4</sup> made an observation which is of great interest in this connection. A woman, thirty-two years old, was gored by a mad steer, producing a fistula below the duodenal papilla; he made observations that demonstrated that digestion was possible in the absence of the entire chyme, together with the bile, the pancreatic juice and the secretions of Brunner's glands, all of which escaped through the fistula. Food by the mouth did not satisfy the appetite and it seemed as if she was doomed to die from inanition. But the food introduced below the fistula was digested and she then gained in weight. Digestion must have been effected by bacteria. At the present time we recognize that



there is a very large number of bacteria which, through their fermentative action, may convert starches into sugars and also cause these very sugars to ferment. For example, the bacillus subtilis and the spirillum of cheese are both capable of converting starch into sugar. Some bacteria and yeast produce invertin.

Quincke<sup>5</sup> states that certain pathological protozoa found in the intestinal tract may produce intestinal dyspepsia. Among the most common is the ameba coli which seems to exert a necrotic and solvent action on the tissues, causing remarkable destruction and breaking down of cells and tissues with the formation of nuclear fragmentation and detritus. The lesions formed are usually found in the large intestines, particularly in the submucous coat. In the superficial epithelium of the intestine is apparently to be found the chief protection against the invasion of bacteria. When the epithelium is well preserved the bacteria are not found in the mucosa beneath; whereas, they may be seen entering it at places where the epithelium has been injured or destroyed. The first step in the pathologic process is probably an injury to the epithelium from an abnormal or excessive fermentation of the secretions in the canal from the toxic products of bacteria or from other factors. These altered relations furnish conditions favorable to the activity and more vigorous growth of the varieties of the bacteria which thrive but indifferently in the normal intestines. It is rather startling to learn that over fifty known species of micro-organisms have been identified at various times in the feces, passed by those suffering from intestinal dyspepsia. Of course, they vary not only with the diet, but with the manner in which the food is prepared. The fewer and less active these micro-organisms the more nearly perfect will digestion be. In addition to these Nothnagel enumerates four different varieties of bacilli, nine cocci and four fungi that were present at the same time in intestinal dyspepsia. Is it any wonder that this subject offers such a tempting field to the investigator, the physiologist, the chemist and the bacteriologist?

V. *Intestinal Dyspepsia Due to Abnormal Gastric Chemistry.*—That abnormalities of the gastric secretion may bring about intestinal dyspepsia is a well-known fact from the meteorism and disturbances of peristalsis which follow upon hyperchlorhydria, and also the diarrhea observed in connection with achylia gastrica. In order that we may have a clearer understanding of intestinal dyspepsia it is necessary, as Dr. Hemmeter has stated, that we should have an analysis of the gastric contents. The entrance of chyme into the duodenum causes a reflex secretion of the pancreatic and biliary fluids to an extent to sufficiently neutralize the acid contents of the stomach and establish a degree of alkalinity which is most suitable for the action of these ferments which complete the process of digestion.<sup>6</sup> Therefore, intestinal dyspepsia may be due to an abnormal performance of function of the stomach as well as of the liver and pancreas. Hyperacidity of the

gastric juice with an abnormal acid state of the chyme may completely neutralize the alkaline secretions of the small intestines and so stop the digestive function. Again a deficiency in the secretion, which permits of fermentation taking place in the stomach, causes the duodenum to receive a large quantity of extremely acid and undigested form of chyme. Atony of the stomach leads to a stagnation of the food aside from fermentation. Dr. William W. Johnson has made the remark that possibly the most prolific element in the cause of intestinal dyspepsia is deficient mastication and insalivation of food. I believe that it is well to bear in mind that sooner or later every case of aberration of function of one portion of the digestive tract will be followed by some derangement of other portions.

VI. *Intestinal Dyspepsia of Nervous Origin—Neurasthenia Intestinalis.*—This demands insertion in this place on account of the one prominent symptom of intestinal dyspepsia, although logically it should be classed among the neuroses. Boardman Reed believes that in more than half of the cases of so-called nervous dyspepsia the trouble is dependent upon actual disease somewhere in the gastro-intestinal tract. Herzog says that nervous dyspepsia is not only a pure sensory, but mostly a mixed, neurosis and oftentimes in connection with a sensory neurosis there exists a neurosis of motility and secretion. In all works upon practice of medicine the prominent influence of the nervous system upon the secretion of the digestive juices has been emphasized and it is not, therefore, surprising that there should exist a state of intestinal dyspepsia of purely nervous origin which cannot be classified under any other heading.

VII. *Intestinal Dyspepsia Caused by Abnormal Substances, or Irritation, Reaching the Intestines from the Blood.*—Under this heading we may class the dyspepsias occurring in uremia, severe malaria, septicemia, croupous pneumonia, erysipelas, influenza, cholera, icterus, diabetes, gout and the uric acid diathesis, diseases of the blood and blood-forming organs, rachitis, osteomalacia and certain infectious diseases such as typhoid fever, dysentery and septic diseases.

VIII. *Intestinal Dyspepsia Due to the Activity of the Intestinal Parasites (exclusive of bacteria), Worms.*—For me to attempt to review the varieties of cestodes and nematodes would, I am afraid, tax your patience. But all varieties of intestinal worms may give rise to intestinal dyspepsia whose severity depends upon the closer approach to or departure from the health of the individual.

IX. *Intestinal Dyspepsia Due to Hyperperistalsis or Excessive Motility of the Bowel.*—Under this heading we may consider motor neurosis, sensory neurosis and secretory neurosis.

(1) *Motor Neurosis.*—(a) Nervous, or morning, diarrhea is a condition observed in nervous and hysterical women and hypochondriacal men. The motor nerves become abnormally irritated

from some emotional disturbance, such as fright, fear or terror, and this causes the diarrhea. It has been observed frequently that in young girls the entrance of food into the stomach causes a diarrhea; the call to empty the bowels may be so urgent as to require them to leave the table before the completion of the meal. (b) Nervous constipation is a condition in which there is a nervous inhibition of peristalsis occurring in the hysterical or emotional patients as the result of excitement, worry, fright, etc. (c) Enterospasm, or nervous cramps, is a condition in which there is an annular constriction of one portion of the intestine from some peculiar reflex. As a result the contents of the bowel are forced against the narrow lumen and so distends the intestines above, causing colicky pains.

(2) *Sensory Neurosis*.—(a) Enteralgia, colic or enterospasm is a condition frequently seen in hysterical, neurasthenic and anemic subjects. There is a pain, neuralgic in character, which may be due to spasm of the intestinal muscles as the result of irritation from drugs, food, poisons or other substances in the intestines. Coarse indigestible or decomposing food may be a cause as well as scybala, enteroliths, gallstones or other foreign bodies that may be present in the intestines. Another cause may be given in blood that is toxic from the absorption of poisons, drugs or from infectious disease. Local irritation from disease of other organs of the body, such as the uterus, ovaries, kidneys or bladder, may be a causative factor. Taking cold is a common cause of colic in some persons. (b) Proctospasm, or neuralgia of the rectum, is quite common in the neurasthenic or hysterical patient and is often secondary to some rectal irritation, as fissure or fistula. (c) Anesthesia. In this condition there is loss of sensitiveness of the intestine to the stimulus of food which ordinarily causes peristalsis. This is quite common in organic brain disease.

(3) *Secretory Neurosis*.—This condition has other names such as mucous colic, mucous colitis, mucous diarrhea, etc. No inflammatory lesions are found. It is supposed to be a functional disorder of a secretory neurosis of the mucous follicles of the colon, causing the secretion of the mucoid substance.

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**Possible Plague in Topeka, Kansas.**—Dr. Charles Lowry, Secretary of the State Board of Health, has gone to Rice County to investigate the cause of nine sudden deaths among a gang of railroad laborers. Dr. Lowry is particularly interested in the report that the deaths were due to bubonic plague. One physician has pronounced the infection black smallpox. The surrounding territory is in strict quarantine. Every case has proved fatal.

### THE RATIONAL TREATMENT OF TETANUS: A REPORT OF SUCCESSFUL TREATMENT BY SPINAL SUBARACHNOID INJECTIONS OF ANTITETANIC SERUM.

BY W. H. LUCKETT, B.S., M.D.,  
OF NEW YORK;

ATTENDING SURGEON, HARLEM HOSPITAL; CHIEF OF SURGICAL CLINIC, MT. SINAI HOSPITAL DISPENSARY.

PRIOR to the discovery of the *Bacillus tetani* by Nicholaier in 1884, the treatment of tetanus had been empiric and symptomatic. The cultivation of the bacillus in an anaerobic medium by Kitasato in 1891, and the discoveries of Catani, Tizzoni and Behring, were followed by the more rational treatment of tetanus; its serum therapy.

But even this has by no means given entire satisfaction. The subcutaneous injection of the antitetanic serum in 290 cases collected by Moschowitz gave a mortality of 40.33 per cent. The failure of this method of administering the serum to materially lower the death rate induced Roux and Borrell to make an attempt to bring the serum into more intimate contact with the higher nerve centers, the parts supposed to be mostly affected; thus originated the intracerebral injections. Of 48 cases so treated, collected by Moschowitz, there was a mortality of 52.08 per cent. This very high mortality is, no doubt, due in part to our rather limited knowledge of the pathological anatomy, and particularly of the pathogenesis of tetanus.

All original observations in this field are by no means concurrent. The most generally accepted view at present points to the motor ganglia of the anterior horns of the spinal cord as being the seat of origin for the tetanic contractions. The more or less constant morphological changes found in these cells of the anterior horns of the spinal cord by Goldschiefer and Flatau, both in experimentally tetanized rabbits, and in autopsies on patients who died from tetanus would seem to substantiate this view.

The cerebrospinal fluid, according to Stintzing, contains a much more active and concentrated toxin than does the blood. He believes that the tetanus bacillus produces toxins at the seat of infection, and that these toxins are carried along the nearest nerves, probably in the interstices of the perineurium and the endoneurium to the spinal cord, and reaching the subarachnoid space of the cord, they produce their toxic effect primarily at the point of entrance into the cord. Moschowitz also says, "that the point of attack for the toxins is certainly the motor ganglia cells of the anterior horn, which get into a state of increased reflex irritability from the action of the toxins."

Blumenthal and Jacobs made a noteworthy attempt, experimentally, to bring the serum into more intimate contact with the primarily affected parts and the toxins, that is, into the spinal cord and spinal subarachnoid space. They experimented upon tetanized goats, all of which died. The failure probably being due to the small subarachnoid spaces in goats, consequent small amount of fluid, and therefore slow endosmosis. They con-



cluded that by the time the chain of symptoms collectively diagnosed as tetanus had presented, the tetanic poison was so firmly fixed in the central nervous system that it could not be removed, and they furthermore warned against a too hopeful result of the intracerebral method of Roux and Borrell. Jacob, since then, reported two cases of tetanus cured by the injection of the tetanus antitoxin into the spinal subarachnoid space.

Accepting the above rather brief statement as the present view of the pathogenesis of tetanus, and that the primary lesion is in the motor ganglia of the anterior horns and that the spinal fluid contains more highly active toxins than does the blood, then, by ratiocination, we conclude that the spinal subarachnoid injections of the tetanic antitoxin, preceded by the withdrawal of the active and highly toxic spinal fluid is indisputably the rational treatment of tetanus.

With this rather brief résumé, we will report the three following cases:

*Case I.*—P. McB., male, twelve years old, admitted to my service at the Harlem Hospital, July 2, 1902, with the following history: Six days ago received blank cartridge pistol-shot wound in palm of left hand. Was treated in an uptown dispensary, where the wound was presumably removed and the wound thoroughly carbolicized with pure carbolic acid. No constitutional symptoms presented until five days after injury, when patient suddenly had a violent attack of dyspnea, followed by slight tremor of left hand and rigidity of muscles of neck and thorax. From the beginning of the attack of dyspnea had constant severe pains in the back and frequent convulsions. Contraction of the muscles of the abdomen and the so-called locking of the jaws were the last symptoms to appear. The period of incubation in this case was evidently five days.

Examination showed a well-developed lad; heart and lungs normal; urine negative. Palm of left hand presented small, round wound, between the first and second metacarpal bones, edges powder-burned. Bottom of wound grayish in color, from which a very small amount of pus could be expressed. No inflammatory reaction surrounding the wound. Accepting Rotter's subdivision of tetanus, would put this case in Subdivision B—a grave case.

Convulsions one after another, and most violent, particularly the muscles of respiration, diaphragm and abdomen. The admission temperature of 98° F., pulse 104, respirations 22, rapidly rose in 24 hours to temperature 106° F., pulse 112, respirations 38 (pulse and respirations counted between the convulsions), and the patient died in the most violent tetanic spasms, particularly of the muscles of the chest. In fact, a member of the House Staff remarked that these contractions were so strong that they simply "squeezed the life out of him." This expression is also used in Allbutt's "System of Medicine," and is not to be wondered at, since they have been so strong as to cause a rupture of the rectus ab-

dominalis and psoas magnus. Indeed, a case has been reported in which both femurs were fractured by the force of contracting muscles in a case of tetanus, and another in which the second cervical vertebra was dislocated. The diagnosis in this case was confirmed by Dr. Harlow Brooks, Pathologist to the Hospital, who succeeded in finding a very few tetanus bacilli in a culture taken from the wound.

*Treatment:* Wound freely opened, and swabbed out repeatedly with pure carbolic acid. Wet dressing applied. Bromides and chloral freely administered. Forced nutrition and stimulation. Hot packs and prolonged hot baths. In fact, he received the useless, empiric and symptomatic therapy usually exhibited in such cases.

This case is reported in contrast to Cases II and III, and in order to emphasize a protest against the useless and sometimes reckless and dangerous employment of potassium bromide and particularly of chloral hydrate; especially against their continued use in cases of tetanus when it is clearly seen that they are absolutely of no avail. They may alleviate the distress, but they do not modify the progress of the disease.

*Case II.*—Male, twelve years old; admitted to my service at the Harlem Hospital, July 12, 1902. Family and personal history negative. Previous history: Diphtheria and scarlet fever six years ago. He received a blank cartridge pistol-shot wound in palm of left hand July 4. The wound had been cleaned and a wet dressing applied at an uptown dispensary. No constitutional symptoms developed until the seventh day, when the child complained of stiffness in the jaw, pain in the

Fig. 1.



*Case II. Tetanus.*—Wound, left palm between second and third metacarpi. The claw-like contraction of fingers is known as "local" contraction or tetanus, and is rarely observed in tetanus. It is not due to an infectious cellulitis nor synovitis.

back of the neck and right side of chest. Admitted to the hospital on the following day.

*Examination:* Well-developed lad, with heart and lungs normal. Small, round wound in the center of palm of left hand, midway between the second and third metacarpal bones, grayish in

color. Edges powder burned. Discharge scant. Most noticeable feature about this hand was the claw-like contraction of all the digits except the thumb, which was in a state of hyperextension, and flexion of wrist on the forearm. This condition was not due to any inflammatory changes (see Fig. 1). There was no cellulitis or tenosynovitis present. It was due, however, to the so-called local effects of the poison, and is not ordinarily observed in cases of tetanus. If present at all, it does not usually last long after its first manifestation, and it thus frequently escapes observation, but in this case it continued for two weeks. Jaws firmly set; Risus sardonius present. Muscles of the abdomen in state of constant tonic contraction. There was also present in this case marked tonic contraction of the orbicularis palpebrarum, the sphincter muscle of the eyelids (see Fig. 2) from photograph taken on the fifth day

Fig. 2.



Case II. Tetanus.—Showing tetanic contraction of cervical muscles, muscles of the jaw and the orbicularis palpebrarum (left eye nearly closed). Antitoxine rash on face. Teeth extracted to insert feeding tube. [Photographed on fifth day after injections of antitoxin.]

after injection). Although the patient is making a great effort to open both eyes and mouth, the left eye is only partially open, the mouth only slightly so. The jaws had somewhat relaxed when photographed. Notice, also, the contractions of the muscles of the neck. They are very rigid, but no opisthotonos present. The shoulders are raised from the bed by the nurse's hand placed at back of head.

When admitted, his temperature was 101° F., pulse 116, and respirations 24. The highest temperature, reached on the third day, 104° F., became normal on the tenth day. Frequent examination of pus by Dr. Brooks failed to reveal the *Bacillus tetani*, but the clinical diagnosis, however, was undoubtedly that of tetanus.

Treatment: In order to give the serum therapy as fair a chance as possible, strict orders were given that no other treatment was to be employed, but, due to a misunderstanding, the wound was swabbed out with pure carbolic acid, once only, which probably partly accounts for the failure to discover the bacillus. Under careful asepsis, a

lumbar puncture was made between the third and fourth lumbar vertebrae, 20 minims of the cerebrospinal fluid were withdrawn, and 8 c.cm. of the antitetanic serum were injected into the spinal subarachnoid space. The injection was made very slowly, consuming about five minutes in time to empty the syringe. There were absolutely no ill effects. On the contrary, after a few minutes the tonic contractions all over the body diminished, and were followed by rest and sleep. Pains in the back of neck ceased. Slight relaxation of the muscles of the jaw, but not enough for mastication, or even to drink from a cup. This remission of the tonic contractions and convulsions lasted about six hours, when the spasms again set in, and the patient had intense headaches. In another hour, the pains were as severe as preceding the injection, especially in the dorsal region and in the abdomen, which was so contracted as to present the boat shape of cerebrospinal meningitis. This would last less than five minutes, when it would partially relax. On the following day, July 13, another lumbar puncture was made, 12 minims of spinal fluid withdrawn, and 11 c.cm. of serum injected, followed by rest, remission of contractions, less pain, etc., as after the first injection. In fact, the patient received daily spinal subarachnoid injections for eight days, all between the third and fourth lumbar vertebrae, as follows:

July 12—22 drops cerebrospinal fluid withdrawn; 8 c.cm. tetanus antitoxin injected.

July 13—12 drops cerebrospinal fluid withdrawn; 11 c.cm. tetanus antitoxin injected.

July 14—5 drops cerebrospinal fluid withdrawn; 12 c.cm. tetanus antitoxin injected.

July 15—40 drops cerebrospinal fluid withdrawn; 10 c.cm. tetanus antitoxin injected.

July 16—2 drops cerebrospinal fluid withdrawn; 12 c.cm. tetanus antitoxin injected.

July 18—None withdrawn; 12 c.cm. tetanus antitoxin injected.

July 19—35 drops cerebrospinal fluid withdrawn; 12 c.cm. tetanus antitoxin injected.

July 24—45 drops cerebrospinal fluid withdrawn; 15 c.cm. tetanus antitoxin injected.

making a total of 161 drops of cerebrospinal fluid withdrawn and a total of 92 c.cm. of the tetanus antitoxin injected.

On July 26, the patient sat up in bed for two hours; was out of bed on July 28, and on July 29 could open mouth as normal, complete relaxation of all muscles. Was discharged from the hospital, cured, on July 30.

Case III.—W. B., male, ten years old. Family and previous history negative. Admitted to the Harlem Hospital, September 10, 1902, on the service of Dr. Haubold, who kindly permits me to report the case, as it was treated according to our observations in Case II.

Present History: Seven days ago, while attempting to vault the garden fence, fell and cut left wrist on the neck of a broken bottle. Was treated at an uptown dispensary, where several sutures were taken in the wound and a wet dressing applied. Five days after injury had severe



abdominal pains. Applied to an uptown hospital for admission and was refused. Was seen on the night of the sixth day after injury by Dr. Bivings, House Surgeon of the Hospital, who diagnosed the case as tetanus, and injected 12 c.cm. of tetanus antitoxin, after withdrawing 125 drops of the cerebrospinal fluid. As the tonic contractions were most marked in the muscles of the abdomen, I believe from the history that the period of incubation was five days, as it was on the fifth day after injury that the patient first complained of the severe abdominal pains which were undoubtedly caused by tetanic contractions. The symptoms in this case, like Case II, were those of Rotter's Subdivision B—a grave case. Without going into further details this case received spinal subarachnoid injections as follows:

Sept. 9—125 drops of cerebrospinal fluid withdrawn; 12 c.cm. tetanus antitoxin injected.

Sept. 10—100 drops of cerebrospinal fluid withdrawn; 9 c.cm. tetanus antitoxin injected.

Sept. 11—125 drops of cerebrospinal fluid withdrawn; 14 c.cm. tetanus antitoxin injected.

Sept. 13—115 drops of cerebrospinal fluid withdrawn; 12 c.cm. tetanus antitoxin injected.

Sept. 15—140 drops of cerebrospinal fluid withdrawn; 12 c.cm. tetanus antitoxin injected.

making a total of 605 drops of cerebrospinal fluid withdrawn and a total of 59 c.cm. of tetanus antitoxin injected.

The reaction after each treatment in this case was more positive than in Case II, followed immediately by a cessation of convulsions, relaxation of contracted muscles, etc. The patient sat up in bed September 22, and was discharged, cured, September 26.

Prognosis in this case was, if possible, more grave than in Case II, yet recovery was most satisfactory under injections of only 59 c.cm. of the antitetanic serum, 33 c.cm. less than in Case II, but we withdrew 444 drops more of the highly toxic spinal fluid than in Case II. In short, I believe that the indication is to withdraw as much of the highly toxic spinal fluid as possible.

In tetanus there is a marked, most rapid wasting and exhaustion. This wearing out of the physical powers, this body weakness, seems to constitute an important and very grave feature of the disease, which, directly or indirectly, seems to aid in producing a fatal ending. Now, the process of alimentary absorption, assimilation and elimination, apparently, are not in the least interrupted nor interfered with. The involuntary muscles of the stomach and intestines are not subjected to the same violent tetanic contractions and spasms as are the voluntary muscles. The indication, therefore, is very strong and positive for urgent and forced nutrition and stimulation.

Cases II and III each received daily from 50 oz. to 100 oz. of fluids by mouth, per tube passed through space created by extracting teeth, or through nose, or per rectum, of milk, gruel, beef juice, orange juice, rice cooked until it could be sucked through tube, and bananas, cut into very thin slices and forced between the teeth.

The antitoxin used in both cases was that of the Board of Health of New York, the immunizing power of which is at least one to fifty million, and 14 consecutive spinal subarachnoid injections, without an infection or complication of any kind bespeaks a perfectly sterilized product, and demonstrates the safety of this method of treatment in trained hands.

In the course of the observation and treatment of these cases, I came to the following conclusions:

1. As no attempt was made to maintain an equation between the amount of spinal fluid withdrawn and the amount of serum injected, that the shock or collapse so often observed following spinal subarachnoid injection of cocaine for anesthesia is not due to an upsetting of the equilibrium of the pressure in the spinal canal, as is claimed by the advocates of this method of producing anesthesia, but is due solely to the physiological action of the cocaine.

2. Given a wound infected with tetanus, I am by no means positive that the anatomical seat of the wound does not play an important rôle in the production of the constitutional symptoms of tetanus, for, again accepting the present view of the pathogenesis of tetanus, any wound infected with tetanus near a large nerve will be more likely followed by constitutional effects of the infection than a wound anatomically remotely removed from the seat of a large nerve. It is possible, therefore, that the space in the palm of the hand, between the first and second metacarpal bone, is a favorable point for an infection of tetanus to produce constitutional effects, because the median nerve in the hand becomes flattened out and much larger at this point; it therefore offers an increased surface with greater facilities for gathering and conveying the toxins to the cord.

3. While I recognize the absurdity in trying to draw conclusions from two cases, the reaction after each injection was so prompt, and improvement so positive, and followed by final cure in both grave cases, that I am constrained to state that I believe in the spinal subarachnoid injection of the tetanus antitoxin, preceded by the withdrawal of the active, concentrated, highly toxic spinal fluid, supplemented by forced nutrition and proper care of wound, we have at least the promise of a method of treatment of tetanus by means of which we can offer more hope in this fatal and rightly most dreaded disease than we have been able to, heretofore.

#### NOTES ON SYSTEMIC INFECTIONS BY THE STAPHYLOCOCCUS AUREUS.

BY E. LIBMAN, M.D.,  
OF NEW YORK.

In the following remarks I intend to make a report of all the blood cultures in which I have found the *Staphylococcus aureus*. These investigations extend over a period of five years. It had not been my intention to speak on this subject at the present time, but the skepticism which

was manifested at the last meeting of the Society has led me to make this report. During the course of my remarks I shall refer to a number of interesting details concerning the cases under discussion; but my main object will be to show that in every case in which I found the *Staphylococcus aureus* in the blood during life, the finding was confirmed. I shall not refer at length to the question of whether the *Staphylococcus albus* occurs in systemic invasions or not. Up to the present time it has been my experience that it occurs in the blood only as an agonal invader, as I have not yet had a case in which I have found the *Staphylococcus albus* in the blood during life and been able to confirm the finding by discovering the same organism in any metastatic focus.

It is of course very important to differentiate the staphylococci found in the flasks and plates. Tubes showing staphylococci should be removed from the thermostat after twenty-four hours and observed for a number of days. Sometimes the aureus color does not develop for several days. Furthermore, it is well to transplant the colonies on to potato, serum-agar, and ordinary agar, particularly if sugar media have been used.

As to the technic I shall be very brief, as I expect to go into this subject on another occasion. The upper arm is constricted by means of a bandage; the anterior aspect of the elbow is then scrubbed thoroughly for from three to five minutes with green soap and water, then rubbed with ether, alcohol and 1 to 500 bichloride. The syringe and needle are boiled at the bedside and the needle is used while still quite warm. If through some delay or difficulty the needle has become cold, it is rapidly passed through the flame to avoid all danger of contamination. Part of the blood is put into flasks and the remainder is plated. The media most commonly used are serum-glucose-agar, serum-glucose-bouillon, and the ordinary media.

Among the following cases there will be found a number of instances of osteomyelitis. It is essential of course to remember that we must look upon the osseous foci in these cases as metastatic deposits, and we must also bear in mind that these cases, particularly of multiple osteomyelitis, are especially seen in children. Jordan has very well called the condition "the septicemia of adolescence." In other words, children with systemic *Staphylococcus aureus* infection are apt to have the bones involved, whereas adults with a similar infection are more liable to have other forms of metastatic lesions. So that the cases to which I refer of this nature are to be looked upon simply as a form of sepsis, the primary focus of which in many of the instances cannot be determined; and for that reason it is not possible in a number of the cases to report the findings in the primary focus.

I believe it is best in speaking of septic cases, to divide them into cases of local infection without bacteriemia and cases of local infection with bacteriemia with or without metastases. However,

in describing my cases I shall for the sake of brevity use the word "septic" in its clinical sense. I wish simply to indicate that the patients had suffered from symptoms which are clinically considered suspicious of pyogenic infections.

In the notes on my cases there will be found a number of reports on the bacteriology of the urine. These, while unnecessary in many of the instances to confirm the blood culture, are of great interest in demonstrating one of the methods by which bacteria leave the body. In a few of the cases, besides finding the *Staphylococcus aureus*, we also obtained a few colonies of *albus*. To the latter no importance must be attached as it is a normal inhabitant of the urethra. In the later investigations a double catheter was used (according to Melchior) and with this the results were more satisfactory.

The cases of which I wish to present the notes are the following:

*Case I.*—March 13, 1898. Osteomyelitis of the tibia; culture, *Staphylococcus aureus*; two days later the blood showed this same organism. The patient died three days later and at the autopsy, made ten hours post mortem, the staphylococcus was found in the heart blood, in an empyema, in infarctions of the lung, in an area of pneumonia, and in an abscess of the kidney.

*Case II.*—This case was reported in detail by Dr. Brill and the writer several years ago. The first blood culture showed *Staphylococcus aureus*; the second blood culture made several weeks later (two days before death) showed the *Bacillus pyocyaneus*. At the post mortem examination the *Staphylococcus aureus* was found in a metastatic abscess in the right vastus externus muscle, and the *Bacillus pyocyaneus* in the viscera.

*Case III.*—*Staphylococcus aureus* isolated from osteomyelitis of the tibia; three days later the blood showed *Staphylococcus aureus*. The same organism was cultivated from the heart blood and from miliary abscesses of the lung, post mortem.

*Case IV.*—Case of carbuncle of the neck with supposed diabetic coma. Blood culture, *Staphylococcus aureus*. Post mortem, staphylococcus cultivated from miliary abscesses of the lung; organism also found in spreads.

*Case V.*—March 30, 1899. *Staphylococcus aureus* reported as being present in the blood. The patient was operated upon the next day for osteomyelitis of the femur. The same organism was found in the bone focus and again in the blood on the same day.

*Case VI.*—This case is one of the most interesting in the series. The primary focus was an osteomyelitis of the femur. The culture sent down from the operating room showed no growth. (This observation is of no significance as the cultures at the time were usually made by an inexperienced helper in the operating room, who either used the loop too hot or did not succeed in planting the material on the agar.) The blood on the day of admission showed the *Staphylococcus aureus*; two days later the same



finding was made; three weeks later the urine showed a pure culture. On two occasions after that it showed no aureus. Suspecting that there might no longer be bacteria present in the blood, a blood culture was made several days later and the blood was found to be sterile. The patient recovered.

*Case VII.*—*Staphylococcus aureus* found in the blood and in an osteomyelitis of the left tibia, also in some pus in the right ankle. Post mortem, *Staphylococcus aureus* in the spleen, lungs and heart blood.

*Case VIII.*—*Staphylococcus aureus* present in the blood, also present in metastatic foci in the skin. A culture from the foci in the femur and tibia showed the same organism. Patient died; no autopsy.

I wish here to refer a little more in detail to the cutaneous lesions which I have seen in a number of cases of osteomyelitis due to the same organism. I have not seen them with other infections, although there is no reason why they should not occur. These lesions may be manifested over the skin of almost the entire body, but are particularly apt to occur in the scalp. They consist of numerous miliary abscesses in the skin with little or no inflammatory reaction. I have not seen similar lesions in any other form of disease. In every case in which they have been noted there has been present a bacteriemia.

*Case IX.*—*Staphylococcus aureus* found in the blood; later in the bone marrow of the femur and in the lesions in the scalp and right leg. Patient died; no post-mortem examination.

*Case X.*—Case of osteomyelitis of the femur. *Staphylococcus aureus* cultivated from the blood and from a metastatic abscess of the side of the face. Patient died; no post-mortem examination.

*Case XI.*—Osteomyelitis of the tibia; *Staphylococcus aureus* obtained on two occasions from the blood and from a focus in the tibia. Two weeks later pus was aspirated from the pericardium which contained the same organism pure. Patient died; no post-mortem examination.

*Case XII.*—Case of post-partum sepsis. It is a common belief that these cases are always instances of streptococcus infections. In the literature there are reported five or six cases in which the *Staphylococcus aureus* was the infecting agent. In my series I have two such cases. In this case the *Staphylococcus aureus* was cultivated from the blood on January 30, 1901; a week later it was again found in the blood; still one week later the urine was examined and found sterile. A blood culture taken on the following day remained sterile, and the patient recovered.

*Case XIII.*—*Staphylococcus aureus* found in osteomyelitis of the tibia on February 16, 1901. Five days later the same organism was found in the blood and three days later in the urine. Twelve days later the same organism was found in another focus in the tibia. A blood culture made the next day remained sterile. Patient recovered.

*Case XIV.*—A case of osteomyelitis of the right femur. (Patient came in too bad a condition for operation.) Hundreds of colonies of the *Staphylococcus aureus* were isolated in 5 c.c. of blood and the same organism was found in pus aspirated from an abscess probably arising in the thyroid. Patient died; no post-mortem examination.

*Case XV.*—*Staphylococcus aureus* found in the blood and in a large area of cellulitis in the right arm. Patient died; no post-mortem examination.

*Case XVI.*—*Staphylococcus aureus* found in the blood eight days before death and again seven days before death. On post-mortem examination a fibrinous area found in the wall of the right ventricle showed staphylococci in spreads and the *Staphylococcus aureus* in pure culture. The same organism was isolated from miliary abscesses of the heart wall, kidney, and from infarctions in the spleen. It was also present in spreads and cultures in submucous abscesses of the colon.

*Case XVII.*—*Staphylococcus aureus* found in the blood; later in metastatic abscess of the thigh, and in the urine. Two weeks later blood culture negative. Recovery.

*Case XVIII.*—*Staphylococcus aureus* found in the blood, in osteomyelitis of the humerus, and in scalp lesions. Patient died; no post-mortem examination.

*Case XIX.*—This patient was admitted suffering from sepsis supposedly secondary to an abscess of the foot. On the day after admission one colony of *Staphylococcus aureus* was found on one of the plates. (12 c.c. of blood had been obtained; 7 c.c. being used for the flasks and 5 c.c. for the plates.) Subsequently the *Staphylococcus aureus* was isolated from a metastatic abscess over the left trochanter, from the urine, and from an abscess in the right vastus externus. The patient was subsequently operated upon for an abscess of the right kidney and the same organism obtained. Patient died; no post-mortem examination.

*Case XX.*—*Staphylococcus aureus* found in the blood and in an osteomyelitis of the humerus.

*Case XXI.*—This was one of the cases of endomyocarditis shown at the last meeting. The first blood-culture was negative. In the second blood-culture 15 c.c. of blood were used and the *Staphylococcus aureus* was found in one of the flasks. At the post-mortem examination the same organism was cultivated from the heart blood and from the center of the vegetations.

*Case XXII.*—Case of the post-partum sepsis. *Staphylococcus aureus* found in the blood the day after admission, and two days later found pure in the urine. Subsequently it was isolated from a pus kidney on the right side and again from the urine. A later blood culture was negative. Patient recovered.

*Case XXIII.*—*Staphylococcus aureus* found in the blood and later in an abscess over the left hip-joint. Subsequently it was found in the urine

twice and in the blood once. At the post-mortem examination the organism was isolated from an abscess of the sclera of the left eye, from a peri-articular abscess over the shoulder, from an abscess cavity in the dorsal region leading to the vertebrae, from an abscess under the left pectoralis major, from a purulent pericarditis and from purulent infarcts of the kidney.

In these 23 cases in which I have found the *Staphylococcus aureus* in the blood during life the finding has been confirmed in every instance. In 330 other blood cultures I have never found a single colony of the *Staphylococcus aureus*. I think then that in these cases there can be no doubt as to the validity of the blood findings.

It will be noted that out of the 23 cases five recovered. It is generally considered that the more bacteria there are found in the blood the less chance there is of recovery. This does not necessarily hold good. The number of bacteria found depends, in some cases at least, upon the time at which the examination is made, as the great tendency is for the body to rid itself of bacteria and for metastases to be established. The blood cultures in the fatal cases under discussion were made at periods varying from one to nineteen days before death. The reports could usually be handed in within twenty-four hours. Sometimes colonies were seen after six or eight hours. In some instances the report was delayed several days as the organism was very slow in developing its typical color.

I wish to thank the members of the medical staff of the Mt. Sinai Hospital through whose great kindness I have been enabled to carry on these studies.

#### ITCHING: ITS OCCURRENCE BOTH AS A CONCOMITANT AND AS A CAUSE OF DISEASE.†

BY EDWARD BENNET BRONSON, M.D.,  
OF NEW YORK.

In a study on "The Sensation of Itching,"\* made some years ago, I endeavored to show that this most common form of paresthesia had its source in the epidermis; that it concerned those simple nerve endings that exist abundantly in the epidermis and whose function can be traced phylogenetically to the earliest periods of animal life. There was at first, in the very early creations of the animal kingdom, merely a general sensitive exterior, capable of reacting to contacts with the external world. This was the primitive sensorium. At this early stage it consisted solely in the sense of contact. Out of this primordial sense-organ, through adaption and differentiation, were gradually evolved, not only the various organs of special sense, but the whole complex nervous system of the highest order of animals. But the simple sense of contact was still retained, little changed in character from its original form. It is a very different thing from the sense of pselaphesia, commonly called the sense of touch, which

is a highly specialized sense, and doubtless dependent upon specially adapted nerve organs.

I believe that it is disturbance of this sense of contact that is the cause of the sensation of itching. That it is the most superficial nerves of the skin that are involved is evidenced by the fact that it occurs only when the disturbance takes place in the epidermis. This is true both of evanescent itching in health, which is produced by the lightest contacts only or by irritants that simply act on the epidermis, and also in diseases of the skin, of which it is never a concomitant unless changes affect the same superficial layer. Connective tissue diseases do not itch, even though superficially located. Syphilis of the skin does not itch, except in those rare cases where the early erythematous eruption is attended with urticarial manifestations (*Roseola urticata*) or occasionally, though very rarely, when pustular lesions invade the epidermis. Lupus does not itch, nor lepra, nor sarcoma of the skin, nor epithelioma. While epithelioma is, in a sense, an epidermic disease, it should rather be regarded as an abnormal invasion of the epidermis into the connective tissue. So long as the epithelial cells remain within their natural boundaries, they are comparatively normal, but the disease proper begins and the cells assume pernicious character only after they have broken through these boundaries, invading a foreign soil.

Mycosis fungoides is an affection closely allied to sarcoma and yet is a pruriginous disease, but its lesions are much more superficially located than those of sarcoma. They occur not only in the papillary layer, but tend to involve secondarily the epidermis, producing effects closely resembling those of eczema. Hence it is that in this disease itching is a characteristic and often a distressing symptom.

The common vasomotor affections of the skin are not associated with pruritus unless the epidermis be implicated in some definite and particular manner. When, however, from any cause itching does occur, the vascular or inflammatory excitement would naturally tend to make it worse. An erythema or any erythematous disease is not *per se* a pruriginous one. The morbid sensation is more apt to be of a smarting or burning character—a sensation that is more closely allied to pain, which belongs to the domain of "common sensation," while that disturbance of the contact sense we call itching is one remove from it. Like pain, smarting is antipathic to itching, and tends to extinguish it. The instinct is to soothe the part, rather than to scratch it. The instinctive impulse in scratching is to attack and remove an irritating something that is vexing the sense of contact.

There is an adumbration of temperature sense in the smarting and burning sensations. To the discriminating sense of temperature smarting of the skin bears perhaps a relation similar to that of itching to the sense of touch, but its mode of production is different, nor is its seat the same. Such disturbances of the epidermis as suffice to

†Read before the Society of the Alumni of Bellevue Hospital, January and March, 1903.

\* Medical Record, Oct. 18, 1900.



produce itching evoke no burning or smarting sensations. These require for their production contacts that are more decided or disturbances that are deeper down.

When pruritus is associated with vasomotor affections of the skin, it is very frequently due to the fact that an element of urticaria is present. Clinically the combination of urticaria and an erythematous affection is by no means rare. Urticaria is liable to occur in nearly all irritative affections where there is hyperesthesia, whether from external irritants or from reflex irritations or from cutaneous inflammatory disease. It is observed occasionally in neurotic or very irritable eczemas. Not always are there well developed wheals, but here and there papules will form that show the peculiar blanched ischemic surface that is so characteristic of urticaria. The production of the wheal is due to something beside the ordinary processes of vasomotor disturbance. Its most important factor is a disorder affecting the unstriated muscular fibers of the skin and its blood vessels. According to Unna, the trouble begins in a spastic contraction affecting the veins, which, preventing the escape of blood, causes the serious affusion and circumscribed edema. A similar contraction of the arterioles accounts for the ischaemia and finally the spasm of the arrectores pilorum, acting as it would upon the highly sensitive root sheaths of the hairs partly, at least, accounts for the itching. Scratching, by increasing the local erethism of the wheal, always aggravates the condition and makes the itching more intense.

It is a fact that in a number of papular, pruriginous diseases of special type, such as lichen planus, prurigo and others, hypertrophy of the arrectores, as shown by the microscope, is commonly present, and it is a fair inference, I believe, that hyperkinesis of these muscles has no slight bearing in such cases on the pathogenesis of the itching. The sensibility of the hairs to contact and the readiness with which itching is produced by such contacts are matters of common observation.

General speaking, pruritic affections are more common in hairy regions than elsewhere. They affect the hairy, outer aspects of the extremities more often than they do the less hairy, inner ones, or the comparatively hairless flexor surfaces of the joints.

Of course, this does not apply to diseases in which the pruritus is directly due to trophic, epidermic changes. Eczema, for example, is rather apt to affect the flexor surfaces, which, being more vulnerable, more susceptible to injury from the nails, are favorite seats of eczematous inflammation. Of all the inflammatory pruriginous diseases, eczema is the one in which trophic changes in the epidermis are most pronounced and obvious. Its distinctive pathological feature is the process of vesiculation, which, located as it is, in the prickle cell layer, is the essential cause of the itching.

Most of the inflammatory vesicular and bul-

lous diseases are more or less pruritic if the lesions are situated in the prickle cell layer. When, as in sudamina, the lesions occur at a higher level itching is absent. The herpetic and pemphigoid affections are all more or less pruriginous. That this is in less degree true of zoster doubtless finds its explanation in the fact that, being a decidedly neuritic disease, the sensation most prominent is a painful one, which would dominate, and considerably annul any sensation of itching. The same is true of a blister from a vesicatory.

Itching is not always a concomitant of epidermic disease. Whether it occur or not depends upon the character of the changes and the manner in which they take place. When they have been effected with a certain rapidity and are more or less acute in character pruritus almost always results. But when they develop slowly, without sudden disturbance of the nerves, which are then able to adjust themselves to the altered relations, there is rarely any itching. Thus anomalies of growth do not itch. In psoriasis, though usually classed with the pruriginous diseases, when its pathological process is of an indolent character, pruritus is often insignificant. The same is true of eczema seborrhoicum. Usually, parasitic diseases do not itch, unless complicated with eczematous inflammation.

But, as we are well aware, morbid itching may occur without any obvious disease of the epidermis, without any trophic disease in the skin whatsoever. When excessive and apparently spontaneous, we call it *Pruritus essentialis*. It may affect some circumscribed area, like the extremities, the palms of the hands, the scalp, the vulva, the anus, sometimes the roof of the mouth or the tongue. For the lining membrane of the mouth, inasmuch as it is derived from the same ectodermic layer as the common integument, shares with the latter the sense of contact. Again, the pruritus may be generalized over the entire surface of the body. The circumstances under which it occurs are exceedingly varied and tolerably familiar. We know that it may be associated with toxic conditions in the economy, with the phenomena of reflex irritation, with neurotic conditions and disorders of the nerve centers. We may vaguely refer it to arthritism, to neurasthenia, hysteria, toxemia, or to some special physiological condition like pregnancy, to the presence of a tumor, to indigestion, or, finally, to the marasmus of old age. But there must be an intermediary. The *tertium quid* remains unsolved. Why, for example, should gout or neurasthenia in certain cases find the nerves of contact or their controlling centers especially susceptible more than any others? There can be little doubt that the central nervous system comprises centers of control for the skin, and what is more for all its peculiar activities and special functions—a field of inquiry too little explored for us to venture upon it. Even were it possible, however, to apportion the degree of influence due on the one hand to disorder of these centers and on the other to the local susceptibility of the skin, the difficulty of finding the prime de-

termining factor in pruritus essentialis would still remain.

Probably in most cases this determining factor resides in the skin itself. Every case of pruritus, whether symptomatic of some local disease or essential is associated with hyperesthesia. In essential pruritus this preliminary hyperesthesia is probably more or less general. Something happens to make it operative only in the nerves of contact. It is seldom that morbid itching at the very outset is absolutely spontaneous. There is almost always, if not invariably, some exciting cause, of however trifling a nature it may be. So long as the nerves of contact are left undisturbed they remain quiescent, but, subject as they are to the general irritability, it needs but the slightest touch to set them in commotion. Contacts, that under ordinary circumstances would be unperceived or imperceptible, the friction of the clothing, an unconscious movement in bed at night, a breath of air, throws them into sudden alarm. The instinctive response is the impulse to scratch. Each point of contact becomes the center of reflux waves of irritation, that spread in widening circles, encountering other circles from other points of irritation, till, finally, the whole cutaneous surface is aflame with furious itching. The perverted sensation once aroused, a reciprocal relation between the cutaneous nerves and the nerve centers causes the one to react to the other, like the oscillations of a pendulum. Irritation in one is reflected to the other, then back again, always in an exaggerated form, and the process thus set up goes on with continually accelerating force.

Often, it may be that there are more definite grounds for assigning the initiative in pruritus to the cutaneous nerves. The common assumption, however, that in the toxemias, in icterus, uremia, diabetes mellitus or lithemia or in the poisoning from drugs like opium and belladonna, the itching that occurs is necessarily due to the direct action of the toxic matter circulating through the skin is not well established. Without doubt there is such a thing as toxic pruritus. But is it toxic always in the sense that the cutaneous nerves are irritated directly, or may it not be that the irritation is transmitted to them secondarily from irritated nerve centers? As the skin is an emunctory organ, toxic substances are doubtless eliminated through it, and in the act of elimination would be apt to cause irritation in the skin. Inflammatory changes often imply such an effect, as in the acute exanthema and probably in many other affections of the skin. But when the only evidence of irritation is in the sensory nerves, it would be quite as simple to refer it to the toxic effect on the nerve centers as to the direct effect on the nerve terminals.

The action of cold is sometimes attended with morbid itching. Occasionally, it takes the form of urticaria. A sudden change to cooler weather, especially cool, damp weather, even the application of a cold, wet cloth to the skin, suffices to develop this peculiar manifestation. This idiosyn-

crasy, however, is rare. Without urticaria cold water, or, more commonly, the cold bath will cause, in some individuals, usually those of highly nervous temperament, an intense itching that may last for several hours. To such the bath becomes a veritable penance.

*Pruritus hiemalis* is another form in which the sensitiveness of the skin to cold shows itself. It begins usually at the outset of cold weather in the late autumn and may continue throughout the winter. It comes on most severely toward night, and, gradually increasing in intensity, it may rob the sufferer of sleep. The extremities, particularly the lower, are more often affected than the trunk, and not infrequently eczema and other trophic changes may be the consequences of the scratching.

In all these cases there seems to be a curious interaction between disturbances of the temperature sense and of the sense of contact. It is not impossible that the intermediary is the motor disturbance already alluded to as a prominent factor in the itching of urticaria. In all of the cases, moreover, the element of hyperesthesia is clearly in evidence and plays a most important part.

In this connection may be mentioned another form of paresthesia relating to the temperature sense, namely, the sensation of burning or *causalgia* that sometimes occurs without the slightest discoverable trophic change in the skin, or any objective change in temperature. It is observed in gouty subjects, the aged, and in those suffering from central nervous disease. It usually comes on at night, like pruritus hiemalis, but only after the patient has been some time in bed, and often becomes so annoying as to cause an irresistible desire to throw off the bed clothes and expose the burning surfaces to the air. That it is allied to the itching sensation is shown by the fact that pruritus not infrequently precedes or follows it. Though the essential predisposing cause is presumably internal, the warmth of the bed is the exciting cause, while hyperesthesia does the rest.

In some of its manifestations there is very conclusive evidence that pruritus may occur as a sympathetic disturbance in consequence of some more or less remote disorder of the interior. This is reflex pruritus. Familiar instances are the itching of the anus or nasal orifices from ascariides in the rectum, of the end of the penis from stone in the bladder, of the vulva from diseases of the internal genitals or from the pregnant uterus. It occurs as the concomitant of tumors in the interior of the body, more especially of malignant growths. Thus Blaschko describes a case of severe and long-continued pruritus over the whole body that was associated with a lymphosarcoma the size of the fist in the supraclavicular region, and which disappeared completely and at once as soon as the tumor was removed. One of the most aggravated cases of general itching in my experience was in a patient with carcinoma of the intestines, involving the lower wall of the stomach. In such cases, however, it is doubtful whether the pruritus be reflex or toxic and due



to the absorption into the system of septic matter. The cause is equally obscure when occurring in Hodgkin's disease and in some forms of leucemia.

Sometimes pruritus occurs as a pure neurosis. It may affect the distribution of a single nerve, as in the case of Crocker's, where it was confined to the region of the sciatic. It may be a symptom of hysteria or of neurasthenia. Sexual neurasthenia is sometimes the only discoverable cause of pruritus ani or pruritus proenitalis.

Itching may have a psycho-sensory origin. As true of all the sensations and higher perceptive senses as well, it may respond to pure mental suggestion. The medical student, if he be rather impressionable, on first encountering a case of pediculosis at the clinic, will hardly escape a creepy sensation in his skin, the effect of pure dread and aversion. There is a class of well-recognized cases in which this feeling of apprehension comes finally to be associated with delusions or hallucinations. The person has a settled conviction that there are lice on him. He even sees them emerge from the pores. He brings them to exhibit to the doctor, who finds nothing but little rolls of epidermis that have been scratched from the skin, and not a sign of pediculosis. Usually, in such cases, abundant scratch marks testify to the reality of the itching, and there may be evidences of secondary eczema or urticaria. In one case it was not lice that the patient saw, but some fine, dust-like material that escaped from the skin, or would come in clouds from the mucous orifices, accompanied always by intense itching. Such cases, of course, imply aberration of mind, but it will generally be found that some sort of irritation of the skin long preceded the mental derangement. Though perhaps there was a precedent condition of irritability throughout the nervous system, there occurred some accidental irritation of the skin, possibly at one time a real pediculosis, which gave the pendulum its first impulse and the continued reactions between the nerve centers and the cutaneous periphery ended by causing disastrous effects in both.

The principle illustrated above is applicable to nearly all the pruriginous diseases. Whether pruritus be the first symptom or not, it always becomes an element of aggravation to the disease. Though it may not be the prime etiological factor, it is at least an "accessory after the fact," and oftener, I believe, than is commonly recognized, is it the primary factor.

We have referred to pruritus ani and pruritus vulvæ, as sometimes the result of reflex irritation—an irritation reflected from neighboring or adjacent parts. But these affections (or rather the hyperesthesia which is always the essential precursor) are often dependent on conditions much more general and remote, a gouty diathesis, for example, or neurasthenia. Now it often happens in such cases that in consequence of the rubbing and scratching of the parts, a catarrhal inflammation is produced—an eczema of traumatic origin. The physician, seeing such a case

for the first time, is apt to attach undue importance to the eczema and to look upon the itching as only its symptom. To be sure, there is no special reason why an eczema should not occur in these situations, as well as elsewhere. But it is safe to say that where an eczema is limited to these parts, and is attended with excessive itching, in the majority of cases the itching was the original trouble, and the eczema the consequence. Cure the itching and the eczema will take care of itself.

*Kraurosis vulvæ*, a disease characterized, when fully developed by decided atrophic changes, is said to begin as a pruritus, and, with some authority, the opinion has been expressed that it is to the long continued irritation, to the rubbing and scratching, that the subsequent trophic changes are due. However that may be, there is abundant evidence that such a sequence does exist in many of the inflammatory reactions of the skin.

Not to mention the impetigos and other infectious maladies that may be distributed over the skin by the finger-nails where there is itching, there are many pure vasomotor disturbances with more or less decided trophic changes that must be attributed to a preliminary pruritus and are simply "scratch-effects." A familiar instance is the so-called "flannel eczema." There clearly the itching is the first effect produced. The papular eczema (improperly so-called) is a purely traumatic affair and the direct consequence of scratching and rubbing.

For such inflammatory papular eruptions, the French (Besnier, Brocq, Jacquet) employ the convenient term "lichenification." The eruption does not show the diffuse impairment of the epidermis characteristic of eczema, nor does it assume the peculiar clinical forms of any of the typical lichens. Its lesions are chiefly associated with the hair follicles which most readily react to surface irritation, and in which it is easy to believe that the element of hyperkinesis already referred to plays an important part. To show that they were the result of scratching, Jacquet\* in a case of generalized pruritus, with marked inflammatory vasomotor disturbance, together with much thickening of the skin, found that when a carefully adjusted dressing was applied to a particular part so as to eliminate all external irritation, in the part so treated, not only did the itching cease, but the vasomotor affection rapidly disappeared also. The conclusion he draws is that in most pruriginous papular diseases it is not the papule, as commonly maintained, that is the cause of the itching, so much as it is the itching that is the cause of the papule.

There is a diversity of opinion with regard to the significance of the papule in prurigo—the prurigo of Hebra. Bernhardt, in a paper on the Pathogenesis of Prurigo (*Arch. f. Derm. u. Syph.*, lvii, p. 175) thought that he had settled it adversely to the opinion of Jacquet in reporting

\* *Annales de Derm. et de S.*, 1890, p. 487.

the case of a man, three of whose extremities were affected with this disease, while the fourth, an arm that had suffered infantile paralysis with retarded development, was wholly exempt both from itching and from palpulation. Because the tactile sensation of this arm was apparently normal, he maintained that it could not be the itching that had caused the papules. If papules had occurred, and without itching, the case would have been stronger. Why both itching and palpulation remained absent is by no means clear. One consideration that might have much significance in this connection is the possible implication of the skin muscles in the motor paralysis of the arm. The characteristic exemption of the non-hairy parts in prurigo is significant. Accepting the view maintained by Auspitz that prurigo is a sensory and motory neurosis combined, in that combination, I believe, lies the essential source of the disease. But wherever it begins and whatever part we assign to sensory, motory or trophic nerves, it is an undeniable fact, and obvious in almost every case, that much the greater part of the trophic changes in prurigo are purely of traumatic origin and the result of scratching.

Even in pruriginous diseases, where lesions have a definitely typical and pathognomonic character, traumatism plays such an important rôle in the spread and continuance of the disease that no measures of treatment have more influence on its course than local antipruritics. This is true especially of lichen planus, in which, although an independent type of disease, the characteristic lesions may be provoked at will by simply scratching with a pin. To antipruritics I would assign almost an equally important place in *Dermatitis herpetiformis*, a neuropathic disease of internal origin and always attended with intense itching.

Indeed, in the treatment of all pruriginous affections, measures directed to the relief of itching are of the first importance. The hyperesthesia that is always present connotes a lessened tolerance of irritation, a diminished power of resistance in the cutaneous nerves and in the cutaneous tissues to traumatism and all injuries. The equilibrium that is normally preserved between the integument and the external world is destroyed. The protection breaks down. The simplest way to reinforce protection is to afford rest. Allay the itching and you eliminate an etiological factor, important always, and often the prime, the essential one of the disease.

**Treatment.**—In determining what measures are indicated in the treatment of pruritus, there are then two facts in its pathogenesis to be chiefly considered. One relates to the hyperesthesia which is the invariable accompaniment of morbid itching as a predisposing element, and the other to a local surcharge of nervous excitement.

The element of hyperesthesia, dependent as it is on morbid conditions more or less general, will be alleviated only as these general conditions are susceptible of improvement. In pruritus essentialis especially, discovery and treatment of systemic diseases or reflex irritations upon which

the hyperesthesia may depend are of greatest importance. Unfortunately, in a large proportion of cases, our search will be attended only with indifferent success, and we can only base our therapeutics on general principles.

Such general principles there are, applicable, both to the treatment of the preliminary hyperesthesia and to the actual occurrence of itching. Their close observance, as well as a strict adherence to them will in the end give much better results than following the prevalent inclination to try every new vaunted remedy, the rationale of which we know little or nothing about. With some theory to start with, even though a faulty one, if there are known facts woven into its texture, we have a standard by which to correct errors as we gradually gather experience. If we rely solely on the experience of others, with empiricism for our only guide, our position is that of the blind led by the blind.

In the treatment of almost every disease we can learn something from nature's mode of relief. It is so in pruritus. It is natural for every animal when it itches to scratch, and for the time being, at least, that simple method does give relief.

It is worth our while to inquire how scratching relieves itching. It is an animal instinct, inherited doubtless, from the remotest antiquity. But so far as the disease pruritus is concerned, the instinct is usually a false one. It assumes the presence of an offending body or miniature attack. There goes with it a subconscious impression of a vague and indeterminate character. Such impressions are always attended with an accumulation and excess of excitement, causing irritation, fret and vexation, which become greater the longer the vague impression lasts. The act of scratching tends to divert the sensory engorgement in the skin into other energies, into freer channels of sensation. The relief temporarily afforded is not unlike that which a quick, vindictive blow at his adversary gives to the pent-up feelings of an injured and angry man. For the instant the accumulated nerve excitement is dissipated.

But while affording temporary relief, or relief that in ordinary, or what may be termed physiological itching, may be permanent, in morbid pruritus, in pruritus dependent upon a preexisting state of hyperesthesia, the effect of this method is to augment the excitation, and will almost surely be followed by another engorgement with greater pruritic excitement than before. Furthermore, the resulting hyperemia, itself an accessory cause of pruritus, will very likely do more than offset the temporary diversion that the scratching affords, and, besides this, the injury done the epidermis renders it each time more vulnerable and more sensitive to irritating contacts. Scratching is an abuse of what would *a priori* seem to be a rational mode of treatment. But there are valuable suggestions to be drawn from nature's method, nevertheless. It is possible to secure the same kind of relief that scratching affords in ways that are safer



and that insure a relief that is more lasting. In the first place, acting on the suggestion of the implied presence of a foreign body, or some extra or intracutaneous irritant, our first care should be to avoid scrupulously all irritating contacts. Attention should be given to the clothing, especially to the quality of the underwear, to protection from changes of temperature, to excessive dryness or scaliness of the skin, to irritating discharges, and incidentally, also, to the prevention of scratching.

When trophic changes in the skin, especially those incident to inflammatory diseases, are the cause of itching, the local excitants are intracutaneous. In such cases, remedies that alleviate the inflammation or tend to heal the local disease are often erroneously called anti-pruritics, because, incidentally, along with the improvement in the inflammatory disease, the pruritus disappears also. Thus ichthyol, resorcin, tumenol, tar, benzoin, benzoin acid and sulphur preparations, relieve hyperemia, which is often an accessory factor in the occurrence of pruritus, and they have a decided healing effect on catarrhal inflammations. But they are not true antipruritics.

But let us return to the suggestions afforded by the action of scratching. As already intimated, it creates a diversion, permitting the release of pent-up nerve excitement, deploying it in the exercise of other activities and other less vague sensations. The mere muscular activity is one diversion. Another lies in the substitution for the vague sensation of itching of another sensation which is more decided and definite, like that of smarting or pain or else one that has a distinct perceptive character. A perceptive sensation is always evoked by a firm and moderately forceful contact. Such diversion can often be made effectual without scratching. Firm pressure of the itchy surface, or, instead of using the finger-nails like claws, drawing them backward with some force but not violently, over the skin, will often give almost the same relief.

The substitution of another sensation for that of itching is the rationale of the action of many of the antipruritics in common use. Thus the vinegar lotion in urticaria or prickly heat, lemon juice, cologne water, the pungent tinctures, as of lavender, veratrum or camphor; chloroform in various dilutions, menthol, thymol and simple hot water act in this way, producing as they do more or less smarting or stinging of the skin. Judiciously applied, and when there is not too much inflammatory excitement, they often give relief and without injury to the skin. Some of them act in other ways also.

One of the most valuable remedies for itching, perhaps the most generally serviceable of all the antipruritics is menthol. It is not an anesthetic to the skin, but it relieves itching as it relieves pain by substituting for these sensations a disturbance of the temperature sense. It is the feeling of coldness produced by menthol applications to the skin that extinguishes the pruritic sensation even more effectually than does the feeling

of smarting. This drug may be used in ointment or oil or in dusting powder, but is more effectual in alcoholic solutions of from 2 to 4 per cent. Dissolved in a little cologne water, it seems even more efficacious, the cologne water itself having some antipruritic virtue. It may be used very freely if there is not too much inflammation, and it is a good plan, when itching is troublesome at night, to instruct the patient to take a bottle of it to bed with him, and to sop the solution on the moment any pruritus begins. To the menthol in the same preparation may be added thymol or chloroform. The last named combination is especially serviceable in urticaria.

Certain remedies relieve pruritus through a sedative action on the skin, including the cutaneous anesthetics. Hot water, when applied for a certain length of time, is decidedly sedative. Useful in many forms of pruritus, it is especially so in itching of the genitals and anus. Camphor combines with the revulsion action already alluded to, a certain degree of sedation. In this connection also should be mentioned hydrocyanic acid and the cyanide of potassium, though they are remedies that I have very rarely resorted to, nor have I found the local use of opium, belladonna, stramonium or other sedatives of the same class of much avail. It might be supposed that such a decided local anesthetic as cocaine would be of great value in pruritus. But on the intact epidermis it is inert, and the same is true of orthoform. They have their uses, particularly in pruritus affecting the lower mucous orifices, which will be referred to later on. Thymol is in some degree anesthetic to the skin, notwithstanding its first effect is irritant, and is especially useful in certain cases of severe and persistent itching; when added to the menthol preparations, its anesthetic action supplementing the peculiar action of the menthol. It is a good antiseptic also. Many of the antiseptics are antipruritic and some of them cause more or less cutaneous anesthesia. Notably is this true of the mercuric chloride and of carbolic acid. It seems to be the property of such antiseptics to retard vital action or, by their further operation to destroy it entirely. It is perhaps by impeding the molecular movements in the excited nerves that they relieve pruritus. Concentrated solutions both of mercuric chloride and carbolic acid produce decided anesthesia of the skin.

Of all the local antipruritics, carbolic acid is the most reliable and has the most lasting effect. It may be used in alcoholic or aqueous solutions, in ointment or in oils. Though more or less efficacious in various strengths, to obtain its best effect, it should be used strong. Its corrosive action on the skin is its chief objection, and it is well also, before applying it over extensive areas to bear in mind the possibility of carbolic poisoning. This latter, I believe, is not a very serious danger if ordinary caution is exercised. Though I have occasionally observed smoky urine after a patient had used carbolic acid to excess, the symp-

tom disappeared readily when the applications were stopped and the harm done appeared insignificant. On the other hand, I have repeatedly encountered cases where patients with severe and extensive pruritus had used strong solutions of carbolic acid freely for months and with no discoverable untoward symptom as a consequence.

The danger of injury to the skin from the caustic action is a more imminent one, when very strong preparations of carbolic acid are used, and such strong preparations are often needed. This caustic action may be neutralized, as it is well known, by alcohol, so that over limited areas the pure acid may be applied if washed off with alcohol directly afterward. Generally I have found a drying oil, linseed oil, more particularly, the best corrigent. The linseed oil, being a keratoplastic agent, serves to offset the keratolytic action of the acid. A little liquor potassi may be added with advantage for its antiecatarrhal effect as well as because it emulsifies the oil, together with some essential oil to correct the odor. The following is the prescription:

R	Liquor potassi .....	℥j
	Acid carbolic .....	℥ij
	Olei lini .....	q.s. ad. ℥j
M	Olei verbenæ .....	℥ij

Applied once a day, especially at night, when itching is always at its worst, this 25-per-cent. solution will often give greater and more lasting relief to an intense pruritus than any other remedy that I know of. Oftener than once a day it should seldom be used, lest it prove too corrosive. This maximum strength is suited more particularly to limited areas of pruritus in which inflammation is not a prominent factor, but the same or a somewhat weaker preparation may sometimes be used to advantage and with safety for severe itching affecting the surface more generally.

These few remedies for external use by no means include all the local antipruritics, although, I believe, they comprise the best of them, or, at least, those that have best borne the test of experience. They chiefly serve, however, to illustrate concretely the application of the therapeutic principles already referred to. They all have for their object to afford rest—to restore equilibrium to the perturbed nerves and they do this either by removal of an offending irritant, by sensory diversion through substitution or by direct sedation or anesthesia.

As to internal remedies for pruritus, aside from the general medication addressed to the special requirements of individual cases, there is unfortunately not much to say that is favorable. There are no internal remedies that can be definitely described as antipruritics. Though pruritus may be removed temporarily by narcotics, when the narcosis of the skin wears off, the condition is apt to be worse than before. Certain analgesic remedies relieve pruritus to a limited degree, but the relief is not lasting, and is offset by greater disadvantages. Thus antipyrine has been used with

some success in itching, but it must be given in depressing doses and is liable to produce irritable rashes of the skin, so that the remedy may be as bad as the disease. The toxic action of opiates on the skin is likewise objectionable, and is even more liable to be followed by aggravation of the pruritus. On the other hand such general sedatives as the bromides are not only useful, but sometimes, particularly when there is great hyperesthesia, indispensable, and occasionally, when aggravated by loss of sleep, a hypnotic like sulphonal is indicated.

In urticaria or in pruriginous affections in which an urticarial element is prominent, there would seem to be an indication for motor-depressants to overcome the spastic contraction of the skin muscles. Atropine is a recognized remedy in such conditions. Given in large doses it will sometimes arrest or abort a paroxysm of violent urticaria in much the same way as does the attack of syncope that sometimes supervenes in severe cases. It is not a remedy I would often resort to, and the same may be said of pilocarpine, which has been recommended, and likewise of gelsemium. To such remedies in the very severe cases the cautious use of chloroform by inhalation is to be preferred, which also relaxes spasm and has not the attendant after-effects.

In toxic urticaria there is also an indication for antiseptic remedies, such as creosote or the salicylates. Administered in full doses during or at the outset of an attack, these drugs sometimes seem to be of decided benefit. This more particularly applies to cases of chronic or recurrent urticaria, in which the attacks are associated presumably with the formation of a toxin in the economy, incidental to deranged metabolism and usually following depressing influences of various sorts, such as overfatigue, worry or exposure. In that simple form of urticaria toxica that is the direct effect of error of diet or, dependent on an idiosyncrasy of the individual, follows the ingestion of some particular article of food or some special drug, a speedy relief may usually be obtained by the administration of a brisk emetic at the outset, or a little later on of a saline purge.

Regarding the management of pruritus senilis, in so far as the disease is dependent on the common causes of itching already cited, little special consideration is required. Many of the common causes of itching are peculiarly apt to occur in the aged, especially such as obtain in pruritus essentialis. When eczema is associated with the disease, as it often is, whether it be the dominant and primary affection or is only secondary, to that mainly should attention be directed. But it is a noticeable fact that in pruritus senilis unaccompanied by eczema harsher methods of stimulating the skin are much better tolerated than in the ordinary essential pruritus. Indeed, patients often find relief that is more or less lasting from vigorous rubbing or friction of the skin, a kind of stimulation that would be pretty sure, in the end to aggravate any ordinary pruritic disease. The difference may be due to the fact that in prur-



ritus senilis a considerable degree of hypopselaphesia is present—sufficient to render tactile impressions vague and perturbing. Paresthesiæ of any special sense are especially apt to occur in conditions of impairment of that sense. General stimulation of the skin tends to relieve the condition of impairment in much the same way as a din of sounds will often restore temporarily an impaired sense of hearing, when to the normal ear it would be disturbing or confusing. But, whatever its explanation may be, such cutaneous stimulation as has been referred to above as "sensory diversion by substitution" is especially effective in pruritus senilis. In this condition, besides friction to the skin, electricity has been found especially useful, particularly faradism or the electric brush of the static machine. Internally cannabis indica, probably because of its well-known sensory stimulant action, is sometimes of benefit when given in full doses. Strychnine is decidedly an appropriate remedy.

For those who are subject to pruritus hyemalis, it is especially important that digestion and general nutrition should be kept in good order and all indiscretions in eating and drinking should be avoided. After any excess in alcoholism, the night itching is always worse. At the first onset of cold weather thick underclothing should be put on, or the legs (where the trouble is usually worst) may be protected by long, woolen, footless stockings, drawn over the customary underwear. An antipruritic should be ready at hand during the night, the best being an alcoholic solution of menthol or thymol. In the morning search should be made for any points of excoriation which are liable to become the starting points of an eczema, and a healing salve should be applied. Inasmuch as the skin is apt to be dry, and a dry skin is prone to itch, cold cream or other unguent should be rubbed in, especially after the bath.

Bath pruritus is more difficult to control, even, than the winter pruritus. Something may be done to mitigate it by certain regulations. The temperature of the water and also of the room should be comfortably warm. Sometimes the addition of salt to the water makes it less irritating. Soap should be used sparingly, and only the blandest kinds should be used. A superfatted soap, such as the thymol Baby Soap of Eichhoff answers very well. After the bath the skin should be thoroughly dried, but with the softest towels and with the least possible friction of the skin, and afterward a little cold cream and powder applied. Arsenic as an internal remedy for this peculiar form of hyperesthesia has been highly recommended, and occasionally has a beneficial effect.

In those localized forms of pruritus that occur about the anus or external genitals, search should first be made for the *indicatio causalis*—for possible sources of reflex irritation, or for any more general condition that may be held responsible, such as lithemia, neurasthenia or diabetes. Excessive alkalinity of the blood is said to be some-

times such a causative condition, and to be amenable to treatment by the mineral acids. Many of these conditions do not yield readily to treatment, and meantime we must chiefly rely on more direct measures, which will usually give a much quicker return.

In deciding what local remedies to use, we should take into consideration the presence or absence of inflammatory complications, nor should the possible presence of pedeculi be overlooked. When inflammation is added to the pruritic excitement, as may be the case in pruritus vulvæ more particularly, the more effective antipruritics may have to be deferred for a night or two. Emollients, lotions of aluminum acetate, simple Lassar paste (without salicylic acid) with two to three per cent. carbolic acid, or with ten per cent. orthoform, perhaps preceded by an application of cocaine, may answer better till the inflammation is allayed. Cocaine is sometimes indispensable when the itching is intense, but it is not a good remedy for prolonged use. It is only serviceable on mucous membranes or abraded surfaces; it gives only temporary relief, and when long continued produces vascular atony and increased disposition to hyperemia, an effect often noticed in inflammatory conditions of the mucous membranes of the eye and nose. Orthoform in powder is often useful on abraded surfaces or fissures both of the vulva and of the anus.

Lassar paste has an advantage over ordinary ointments (which as a rule are not well borne in pruritus of the vulva or anus), because of the starch which it contains, which makes it less heating as well as permeable to moisture, promoting the escape of any irritating exudations from the surface.

Applications of hot water sometimes have an excellent effect, especially where the parts are thickened from traumatism or long-continued inflammation. The temperature of the water may be gradually raised to 110° F. and the applications should be continued for several minutes.

But the sovereign remedy for pruritus vulvæ or pruritus ani is carbolic acid. No other remedy is so effectual or gives such prolonged relief. A single application of the strong oil mentioned above will often afford rest and release from itching for an entire night. But it should not be often repeated nor applied too lavishly. More than one or two applications of this strong preparation in twenty-four hours would be liable to do injury. The principal seat of itching, whether of the anus or vulva, is just at the junction of the skin with the mucous membrane, and much beyond these regions the applications need not go. Should the itching recur during the night, it is better to employ some other antipruritic, such as a five-per-cent. solution of menthol in olive oil or cocoa butter applied on a folded rag or bit of sheet lint. In less acute cases there is a multitude of remedies that will give more or less relief. Where a catarrhal condition is present, an excellent application is the watery solution of ichthyol (from 3 ss. to 3j to the ounce)

allowed to dry on, more especially for pruritus ani. Painting the surface with tincture of benzoin is recommended, and in some cases that are rebellious a good effect is produced by nitrate of silver, 5 to 30 grains in water or as advised by Crocker in sweet spirit of niter. The nitrate of silver solution is also very useful in pruritus of the scrotum. In pruritus ani the method advised by Allingham is sometimes worth trying. It consists in introducing a conical plug of bone or other hard substance into the anus at night and retaining it in place by a suitable dressing. It acts on the principle of diversion. The same principle explains the good effects of multiple scarification in old cases of pruritus of the scrotum, as recommended by Vidal.

#### THE ROENTGEN RAY: ITS MECHANICS, PHYSICS, PHYSIOLOGY AND PATHOLOGY.\*

BY EDEN V. DELPHEY, M. D.,  
OF NEW YORK.

THAT form of energy, known as the Roentgen or X-ray, is produced by the bombardment of molecules against a metal plate in a vacuum of high degree. So far the only means we have at our service for producing this intense bombardment and its consequent X-ray is the electric current. The X-ray is not some form of electricity, but is a higher rate of vibration even than light, and is the transformed energy of the electric current. This latter is simply the mechanism for its production. Any other form of energy, which would bombard the metal plate with sufficient intensity, would also produce the X-ray, and it may be in the future some such other method may be discovered.

The apparatus for producing this electric current is of two varieties: Static machines and coil machines, and this latter may be divided into two sub-varieties: ordinary Rhumkorff coils and high-frequency coils, in which there are one principal and many minor surges to each interruption.

The usual static electrical machine, having ten or more revolving plates, when run by a motor produces a very efficient current for exciting the X-ray tube, especially for fluoroscopic work.

In using the static machine, there are four methods of connecting up the tubes. (1) By connecting the anode of the tube to the positive terminal of the prime conductor, which may be distinguished as the one having the longest white end to the spark when the terminals are brought close together, and the cathode end of the tube to the negative end of the prime conductor; (2) by connecting as before with a spark-gap, either single or multiple in series; (3) by connecting up as in second with the Leyden jars in parallel; (4) by connecting the cords to the outside of the Leyden jars, bringing the terminals of the prime conductors close together, sparking across (or an adjustable spark-gap may be arranged in place of

the single spark), thus producing an induced current through the tube, but in the opposite direction from the direct current and therefore the tube must be connected up accordingly.

Sometimes although the current is passing through the tube properly, as in first, the X-rays are not produced and this can often be remedied by putting a spark-gap, either single or multiple, in series, as in second, and even that may be improved by putting the Leyden jars in parallel, as in third. There is no absolute rule to determine the length of the spark-gap, and although it is generally required at the anode, it may be necessary at the cathode end of the tube or both. It must be learned by actual trial. I have found that the multiple spark-gap gives the steadier interruptions and therefore a steadier output of the X-ray, and by its use a tube, whose vacuum and resistance have fallen so low as to seem to require re-exhaustion, may be excited to perfect radiance and the life of the tube not only renewed but apparently resurrected.

The Rhumkorff coil, of sufficient size to produce a spark six inches or more in length, is an excellent means of exciting the X-ray tube. Its special advantages are its portability and its readiness for use in all kinds of weather. Its disadvantage is the greater amplitude of the current which is manifested by the fatter spark, and its consequently greater likelihood to burn the patient.

All the best Rhumkorff coils have the secondary wound in sections so as to avoid the danger of sparking across from one point to another of the highest potential which, by burning out the insulation, would destroy the usefulness of the coil. Some coils also have the sections on movable spools, any one of which can be removed at will for repairs if needed. Some coils also have means of varying the length of the primary as in the Scheidel coil, in which there are three separate sections of the primary which may be used singly, part or all together in series or parallel. This of course varies the amount of the inductance in the secondary coil and therefore the output of the apparatus. In his apparatus, Heinze has arranged four Leyden jars so that two are in series and two in parallel in succession, and the current from these can be used or not at will.

The current in the secondary coil is induced almost entirely by the break, not the make, in the primary, and is also almost in proportion to the suddenness or sharpness of such break in the primary current. Therefore it is usual to employ some means to accentuate the sharpness of the break. This is done by placing a condenser in shunt with the primary winding. This condenser is composed of a number of layers of tinfoil separated by a dielectric and produces the effect of a number of Leyden jars connected in parallel.

The Kinraidai high-frequency apparatus has the coils wound in a flat spiral, the secondary inside the primary, in such a manner that there is small likelihood of sparking between the ends of

\* Read at the Nineteenth Annual Meeting of the New York State Medical Association, Oct. 23, 1902.



the secondary. The interruptions are produced by sparks across the space between two water cooled copper-plates and consist of oscillations made up of one principal and many (about twenty) minor surges of current in the primary and consequently of the same number in the secondary coil.

The interrupters for the primary current in the coil machines may be divided into four varieties: The mechanical, the mechanico-electrolytic, the thermo-electrolytic, the electrolytic.

For low tension currents some form of the spring interrupter is usually satisfactory, but with high tension currents the amount of erosion on the surface of the contact points is so great as to interfere with the flow of the current, thus rendering them practically useless. Therefore other means have been devised to interrupt the circuit. One of these is the slate wheel, having a segment of copper whereby a contact is made, completing the circuit, at each revolution: the length of the make and break being proportionate to the length of the copper and slate arcs. It can be speeded up to fifteen hundred revolutions per minute and is one of the simplest and best interrupters made. There are two mercury-dip interrupters. One in which a rod is dipped perpendicularly, and the other where the rods are radii of a circle. They both make a contact and complete the circuit with each dip of the rods. In the Max Levy mercury interrupter the liquid mercury is pumped up by an Archimedean screw and is forced out laterally through tubes and strikes the downward extending fingers of a rotating piece of metal which is connected with one pole of the current, but is insulated from the other. The current flows through the mercury, the arms, the fingers, and is interrupted as it passes across from one finger to the other. The Cunningham interrupter is similar except that the screw and arms revolve while the insulated segment with fingers is stationary. Wherever these arms, ejecting mercury, revolve very rapidly, (he claims as high as twenty thousand per minute), the mercury is apt to feather, and to prevent this he has arranged two horns which scoop up the air, and as it passes out of the opposite end it blows off the jet as it passes each finger of the insulated metallic segment. In this interrupter the current does not pass through the whole mass of mercury, but it goes in at one segment across the mercury and arms and out at the other segment.

The Heinze mechanico-electrolytic interrupter is a combination of the slate wheel with the copper segment and the perpendicular dip interrupter. At each dip the current is conveyed by the electrolyte and is broken by the slate wheel, by the withdrawal of the platinum point and also by the bubble of hydrogen gas. A brush is so arranged that the current may be passing during the whole time or during only part of the time the platinum point is dipped into the electrolyte. In this manner the contact may be quite long or exceedingly short.

In the thermo-electrolytic interrupter of Caldwell, the interruptions are caused by the tension of the current passing through the small hole in the partition which divides the two chambers. This heats the electrolyte to the boiling point and the bubble of steam cuts off all electric connection between the two chambers. The Wehnelt is a pure electrolytic interrupter and the current is broken by the passing of a bubble of hydrogen gas through the hole in the partition.

The rapidity of the interruptions in these last two apparatus and their several modifications is due to the size of the hole and the tension and amplitude of the current, and may be somewhat modified at will. The former claims that the interruptions from his interrupter are so sharp that a condenser is not needed.

The Bario-vacuum regulator consists of a hard rubber tube enclosing two terminals, forming a spark-gap, and is connected in shunt with the adjustable tube in such a manner that, when the resistance through the tube is greater than it is across the gap, the current jumps across and passes through the adjusting chemical and thereby lowers the vacuum. Its advantage is that the sparks being enclosed do not annoy the patient.

The X-ray tube consists, usually, of a very thin glass globe about six inches in diameter with extensions at opposite sides, four to six inches long and about an inch in diameter. These extensions convey and support the terminals and also form handles whereby the tube may be supported. The cathode is a cup-shaped disk, usually of aluminum and is situated just within the circumference of the globe. The anode is usually made of platinum, although in some imported tubes, the anode is made of a peculiarly hardened piece of iron or steel. The anode should be in the center of the sphere and at an angle of  $135^\circ$  to the current of the cathode stream. This is the simplest form of tube. Some others have an extra attachment for holding the tube; others have two anodes claiming the output is very much increased thereby. Inasmuch as the vacuum of all tubes varies very much at different times during use, and always tends to become higher, both in vacuum and resistance, by the absorption of the gas still contained in the tube, or its adhesion to the inner surface of the sphere, a small extension is blown into one side of the tube handle and this is filled with a chemical which gives off gas or vapor when the electric current passes through it. Different makers use different chemicals or combinations of chemicals. The most common are potassic hydrate, sodium formate, nitrate and nitrate of ammonium, copper sulphate and dioxide of manganese; but the use of potassic hydrate is most favored. The electric connections can be so adjusted that as the vacuum becomes too high and the internal resistance too great, the current, taking the path of least resistance, jumps across to the terminal imbedded in the chemical letting off a small amount of gas or vapor thus lowering the vacuum. Another adjustable tube is made wherein an extra cathode, placed in a subsidiary

chamber, is composed of such a substance that it gives off gas when the current passes through it, thus lowering the vacuum. On the opposite end of the same chamber is placed a spiral of platinum wire which gives off a shower of fine platinum particles, thus raising the vacuum when the current from the positive pole is passed through it. In this tube the vacuum can be raised or lowered at will. Some manufacturers have a method of treating the anode, others of making the anode of selenium iron, and others of washing the inside of the glass with some secret chemical, which gives out gas when heated by use or by other means. Some tubes are likely to drop their vacuum so as to be nearly if not altogether useless, and yet such a tube may often be excited to its former radiance by putting a single or multiple spark-gap in series.

On account of the liability of the anode to burn out when forced, a tube has been made with a rotary target, and when one part is burned through, by giving a slight jar, another place can be brought into focus, thereby increasing and extending the life of the tube. Other tubes are made whereby the anodes are kept cool by a current of water which traverses the stem and carries off the heat from the back of the target.

For the alternating current the tubes may be made the same as for the direct current, but, by so doing, one-half of the energy is lost; or by placing cathodes at both ends and a double anode, whose surfaces converge at an angle of about  $60^\circ$ , in the center of the sphere. The wires are connected at the ends of the terminals indifferently as the current is alternately positive and negative, and the anode is connected with a good "ground." The difficulty with this tube is to get the two sides of the double-faced target focussed exactly alike; although the current is an alternating one the output of X-rays is continuous.

In the Caldwell double-focus tube, the two anodes are about three inches apart, and it is used in connection with his stereoscopic fluoroscope, Caldwell's treatment tube, which is similar to the endodiascope of Bouchacourt, consists of a pear-shaped globe with the cathode in the bulbous end, the anode in the side, and a platinum target at an angle of about  $135^\circ$  to the cathode stream at the extreme tip of the tube. The cathode stream passes in straight lines to the target, while the anode stream turns the angle of the tube to meet it. Because of its smallness, its shape and general construction, the smaller end can be introduced into any artificial or natural orifices of the body and the X-rays brought into close contact with the diseased part, thereby being much more efficacious. These tubes of course can be made of a high or low vacuum as desired.

As the X-ray is invisible it is necessary to have some medium to translate or transform it so that its manifestations can be perceived by the human eye. This is done by means of the fluoroscope. This consists of a piece of cardboard covered with a thin layer of some fluorescent substance, preferably platino-cyanide of barium. For convenience,

this is made the base, fluorescent side inward, of a pyramidal box, of which the apex is cut off and adjusted to the face about the eyes, so as to cut off all external light, in order that the fluorescent picture may be more distinct. Caldwell has arranged an alternating shutter which cuts off the fluorescent picture from each eye successively at a very rapid rate, this in connection with his double-focus tube gives a stereoscopic effect—solidity—to the mental perception of the image.

The actinometer consists of a small fluoroscopic screen arranged in a pyramidal box with two sets, of ten each, of circular discs of tinfoil with holes punctured through them, so that any number of layers of tinfoil can be brought between the screen and the tube, and as one set of discs is ten times as thick as the other, the resistance to penetration may be rated from one to one hundred. This apparatus determines the penetration, but not the amplitude of the X-ray, and as the actinic effect of the ray is determined by, and is in proportion to, both the amplitude and penetration, it should more properly be called diapirometer or diaperometer. Still this is a very useful instrument to register the quality of the tube in therapeutic work.\*

*Physics.*—The human faculties are capable of being influenced by certain variations, intensities and rapidities of energy, but not by all. The lowest of these is recognized as motion by the senses of touch and sight. When these vibrations increase in rapidity to the number of sixteen per second they are perceived as the lowest audible sound, although we have reason to believe that certain insects are susceptible to the sounds which are inaudible to the human ear, both because of the slow vibration and the consequent low pitch and the rapid vibration and consequent high pitch. The highest audible sound consists of vibrations at the rate of forty thousand per second.

Between the waves of sound, which are air waves, and the waves of heat, which are ether waves, there is quite a gap, in the rapidity of the vibrations which the human faculties are unable to perceive. In this gap are the Hertz waves, which are employed in wireless telegraphy and which are approximately two hundred and thirty million per second.

The next rate of perceptible vibrations is recognized as heat. Heat and light overlap. The infra-red rays being one hundred billions per second, while the visible colors of the spectrum, range from four hundred to seven hundred and fifty billions per second. The ultra-violet rays vibrate at about the rate of two trillions per second.

\* Since writing the above, I have learned of two methods of measuring the output of X-ray tubes. The first is the "X-ometer" of Buguet and consists of an apparatus for measuring the fluorescent effect of the rays in units of and compared to standard decimal candles.

The second is the chromo-radiometer of Holaknecht, the court expert of Vienna. The principle of this is the same as that employed to determine the length of time required to print photographs and have them all of the same tone, and it consists of a mixture of chemically pure chloride and sulphate of sodium, which turns from yellow to lavender according to the time of exposure to the X-rays. By comparison with a standard scale he determines the actinic power of the given tube for a specified time, and he affirms that the physiological and pathological effects are in direct and exact proportion to the actinic effects indicated by his apparatus.



The Becquerel rays are higher and the X-rays still higher yet.

Light passes through substances in direct ratio to their translucency, a quality which we cannot comprehend and which is not in inverse proportion to the substances' density. Light may be reflected, refracted and polarized; so may also the Becquerel rays, but not to the same extent as light nor even as the ultra-violet rays, and these Becquerel rays are undoubtedly midway between light and the X-rays. The X-rays are the highest form of vibration which we know as such. The waves are undoubtedly too small to be reflected by any polish we are at present able to obtain, when we do our best the surface is still too rough; or to be refracted by any mechanism we are at present able to construct. The rays travel in straight lines and cannot be bent or diverged by a magnet or by any other known means. They induce chemical action—are photographic—cause fluorescence, discharge electrified bodies by making the air a good conductor of electricity as it may be demonstrated by the electroscope. I had a number of pocket batteries in my X-ray room and I found in a short time that they had been entirely discharged. As I had not used them I was at a loss to understand the cause and at first attributed it to the deterioration of the ingredients, but it was either due to the X-rays short circuiting the batteries, or to the reduction of the chemical ingredients of the batteries by the X-rays which passed through the containing cells. Later by putting them—other pocket batteries—in another room with a thick brick wall intervening, I subsequently found that they did not discharge on standing.

The cathode stream in the X-ray tube consists of molecules of gas, still contained in the tube, and the negative ions moving in a free path on account of the tenuity of the vacuum (about one two-millionth of an atmosphere). They move in straight lines from the surface from which they are given off, therefore the cathode is made concave, so that the rays may converge to a point on the target. After these rays meet to form a pencil, they do not diverge, but continue in a straight line until they meet some resistance. Therefore the target should be a little beyond the true focus of the concave disc. The cathode stream may be deflected by a magnet in the same manner as the electric arc, but the X-rays cannot. When the cathode rays bombard the target, there occurs a transformation of energy and the resultant X-rays are emitted in all directions from the point of bombardment.

Why the platino-cyanide of barium becomes fluorescent we do not know. We recognize the fact that it does so and make use of it accordingly. Inasmuch as the X-rays pass through substance in inverse proportion to their density, it follows that the denser substances will cast the deeper shadows, and these lights and shadows make the picture on the fluorescent screen and photographic plate. Since the X-rays diverge from a small point on the target, the nearer the

object is to the tube, the greater will be the magnification, and vice-versa.

When the current is continuous, the higher the vacuum the greater the penetration because as the molecules have a freer path they strike the target with greater force, and consequently the X-ray is more intense. With all the other conditions and vacuum the same, the resistance to the electric current in the tube is not always the same. A non-adjustable tube will vary its resistance both up and down while in use, as indicated by sparking across between the terminals of the prime conductor when they are adjusted at a distance just a little greater than the resistance of the tube. The larger the amplitude of the electric current the greater the amplitude of the X-rays and therefore the more the actinic and physiological effects. Yet these effects are not directly proportional to the variation in the cause.

Sometimes the tube is so low as to give off no, or almost no, X-rays, but by putting a spark-gap in series with or without the Leyden jars in parallel the surges of the cathode rays are started in tube, and the bombardment against the target is thoroughly effective, producing X-rays of high penetration. The advice is often given not to heat the target, but I have found that if we wish good penetration, we must force the current till the target is at a white heat. Of course, the target is soon burned through, but that is one of the expenses of doing good work. The heat does not produce the X-rays, but the cathode stream produces the heat, the X-rays and an undertone of vibration which is manifested as yellow or apple-green light.

When the X-rays strike some resistance another set called the S-rays are produced, and when the X-rays pass through some trans-radiant medium, still another called the S' or the Goldstein rays. These all have slightly different characteristics.

*Physiology and Pathology.*—Whether it is the X-ray itself or some other similar form of energy which accompanies the X-ray, which produces the physiological and pathological results, we are not at present able to determine with positiveness. There are a number of theories projected to account for these results, viz., (1) Mechanical bombardment producing congestion, just as any other irritant does; (2) ionization, by disarranging the ions of the molecules protoplasm; (3) induction by producing currents and countercurrents in the tissues; (4) de-electrification, which would be the opposite of electrification, either direct or by induction; (5) actinic or chemical effect. There is no reason to doubt that the X-ray may produce chemical action in the tissues, just as well as they do on the photographic plate, and this may be beneficial or harmful, according to the conditions and circumstances of each case; (6) neuro-trophic effect. As yet we have not learned on what nerve action depends, and therefore cannot determine whether or not the X-rays cause interference with this action; (7) interference of energy. Every cell and every part of protoplasm of every cell,

in the body, is producing energy, and the sum of these energies constitute life. What life is, investigators have tried for centuries to determine, and they are no nearer the solution now than in the beginning. It may be that it is only some higher form of energy than heretofore discovered, and it may be altogether different. But just as one form of energy may be modified by another, even though the interfering energy may be of a lower order, just so it may be that the physiological effects may be due to such interference.

The pathological effect of too long or too frequent exposure to the X-ray or a reasonable amount of exposure, in a case where there is a susceptible idiosyncrasy, produces a dermatitis which is commonly called an X-ray burn. Beck\* divides these into three stages of degrees: (1) Hyperemia with infiltration of epidermis, reddish terra-cotta color, itching, etc. (I have found also considerable tension to and a pebbly condition of the skin. Each "pebble" coming to the surface, often exuding a very small drop of thin serum, and exfoliating as the burn heals); (2) blistering, with other symptoms increased; (3) a necrosis of the true skin and underlying tissues. Codman† says that there have been less than 200 accidental burns reported. Less than one-half were serious and about one-third occurred in X-ray workers. One-third of all these burns occurred within four days from the time of exposure; one-half before the ninth day, and if the part is not burned within three weeks, it is not apt to occur at all. No burn will be produced by an exposure less than the equivalent of five minutes at ten inches. Low or soft tubes are more apt to burn than high or hard tubes. There is no good evidence of injury to the deeper structures without primary injury to the skin. Scholtz‡ reviews the literature of X-ray burns and says that:

Neisser compares the action of the X-rays to the inflammatory process of the tuberculin reaction.

Kaposi ascribes the action of the X-rays to changes in the circulation and also to fatty degeneration and molecular disintegration, resulting from inflammatory infiltration.

Oudin, Bartholomy and Darrier examined the skin from rayed guinea-pigs and found thickening of the epidermis and increase of prickle cells, rete cells and nuclear epithelia. The vessels of the cutis and sub-cutis showing no change.

Jutassy found similar changes in rabbits.

Unna found on examining human skin, using a special stain for elastic fibers, a change in the collagen; it was basophilic, but the elastic fibers were not stained.

Gossman found in an ulcer, a necrotic structureless mass in the superficial portion and masses of fibers, nuclei, leucocytes and remains of connective tissue bundles in the deeper por-

tion. The vessels showed a degeneration of the muscular layer and intima with vacuoles in the epithelia. The cell elements were swollen and the intersubstance increased with irregular spaces containing vacuoles—indicating edema.

Scholtz also made numerous experiments on animals and says that the X-rays themselves are the only or at least the essentially active factor in producing the effects attributed to them; effect both at point of entrance and exit, appearing in some days, the acme in some weeks. The bacteriocidal effect is insignificant and scarcely plays any rôle therapeutically. The changes in the blood-vessels have probably much to do with the further development and slow healing of the ulceration.

He made sections of the skin at the end of twenty-four hours and found the protoplasm of the prickle cells diffuse, the outline was not so sharp as in the normal, and stained more than normal. Another section was removed at the end of seven days and it showed the nuclear layer loosened and containing fewer nucleated cells than normal. This layer was diminished and in some cases it had disappeared. The prickle cells were swollen and contour altered and the nuclei generally stained poorly. The chromatin appeared in clumps; the protoplasm of the cells and the nuclei swollen and often vacuolized. The corium was edematous; the connective tissue was somewhat swollen and homogeneous and stained poorly; the cells of the sweat glands showed slight degenerative changes, and the same conditions were found in the cells of the intima and media of the larger, but not of the smaller blood-vessels. Often the cells of the intima were loosened and projected into the lumen of the vessel. In more severe cases, a high grade of inflammatory reaction changes were observed with rich infiltration of polynuclear and mast cells. The elastic fibers of the skin stained poorly. The hair bulbs showed some degenerative changes in the rete cells and were often surrounded by masses of leucocytes. He summarizes as follows: (1) The X-ray causes slow degeneration. The connective tissue, the elastic fibers, musculature and the bones are not at all or are only slightly affected, and only suffer secondarily to inflammatory action. The first change is a degeneration of the epithelia. There were also localized masses of the cells of the glandular organs, of blood-vessels, of muscles and of connective tissues which show degeneration. This degeneration is both of the cell body and nucleus. (2) As soon as the inflammatory reaction has reached a sufficient degree, there is increased vessel dilatation with serious effusion, infiltration of cells and emigration of leucocytes until the structure is lost in a mass of infiltration.

400 West Fifty-seventh Street.

**The Destruction of Rats.**—The belief gains ground that not only is bubonic plague spread by rats, but that any infectious disease may be carried by the rodents. In consequence, a premium is being offered in Copenhagen for every rat killed; and Stockholm has adopted the same measure for the extermination of the pests.

\* Medical Record, Jan. 18, 1902.

† Philadelphia Medical Journal, March 8 and 15, 1902.

‡ Arch. f. Dermat. und Syph., B. LIX, Nos. 1, 2, 3.



## THE CONGENITAL CRIMINAL.\*

BY ROBERT T. IRVINE, M.D.,

OF OSSINING, N. Y.;

PHYSICIAN SING SING PRISON.

If I felt that the subject which I have been asked to introduce to you depended upon anything certain in my own researches for exciting interest, my anxiety would be indeed great; and, if I suspected that your unexplained residua was much less than my own, my fright would be measureless. As the conditions are my feelings may be best described by an illustration which you may have heard before.

A showman who found himself in one of our Southern cities with a menagerie reduced to a healthy tiger and a very sick lion, was finally compelled to take the pelt off the latter and bury the carcass. Whereupon the enterprising impresario went forth on the streets of the city to procure a substitute for his dead lion which he at last obtained in the person of one Patrick Casey, who agreed to wear the lion's pelt and roar for a certain stipend. All went well thereafter with the menagerie until the owner conceived the idea of entertaining his audience, as he expressed it, "by placing these two wild beasts of the jungle in the same cage for the first time." Pat heard this announcement with dismay, but before he had made up his mind as to his own course of action, the rear ends of the cages were backed together and he was being prodded out of his cage into that of the tiger. Pat gave one glance at the animal and the two big ferocious eyes fixed on himself, and put up a howl and a prayer in the Irish tongue to the patron Saint of all good Irishmen. Then the tiger walked over to him and said: "What's the mather wid ye? Shure ye needn't be afraid. I'm Oirish mesilf."

Understood in its entirety, the law that each plant or animal, if it reproduces, gives origin to others like itself, is so familiar by daily illustration as almost to have lost its significance, but to prove the transmission of those structural peculiarities which have resulted from functional peculiarities, and the evident inherited processes of "brain registration" involves some difficulties beyond the faculty of faulty theorizing or the summarized conclusions of the most profound and abstruse arguments.

It is a sad mission, it has been said, to cut through and destroy with the scalpel of analysis the delicate and iridescent tissues with which our proud mediocrity clothes itself. Very unsympathetic is the science of truth. Yet, after all, and I suppose doctors will agree with me, the last word of all our wisdom is this—"It is pretty nearly made out." In a purely scientific mood we may say, It is a long way from the old savage idea of the dragon swallowing the sun to the interposition of the moon's dark body between us and that luminary. The dragon was a figment of the fancy, but the eclipse was none the less a fact. Still, "it is pretty nearly made out" that the latest edition

of every thought, or "fancy," must disown so much in preceding editions—as imperfect, impressions misinterpreted, essentials of situations missed, that the original theorizing, like the "wisdom of the ancients in the light of later knowledge, seems grotesquely erroneous."

Our modern physiologist does not hesitate to reduce love to a play of stamens and pistils, and thought itself to a molecular movement, while alienists class the highest flights of human genius as teratologic forms of mentality, a variety of insanity.

In our profession, without a sure experimental basis, any theory of congenital mental capacity arouses only a feeling that seems to vary between utter indifference and faint curiosity. Yet the facts in relation to the transmission of mental abnormality we are compelled to accept. We do realize the problem of the heredity of mental characteristics, but not how to meet the same with a solution. Here, as in all departments of the efflorescence of the human mind, the beginnings are lowly, but here, more than in all others, necessarily so. For that which concerns the psychology of thought is so hidden by vanity that men never make a truthful revelation of themselves except in cases where there is a complete dis-equilibrium of the intellectual faculties. Only the physician knows how often moral insanity and epilepsy are associated with high grade intellectuality, and how difficult these forms of mental alienation are to verify, because they are nearly always denied.

Very many times each year, in the performance of duties which are in the highest sense judicial as well as medical, I am confronted with this question, "How many of the malefactors of to-day have inherited from their own ancestors the predisposition to steal their neighbors' goods, to destroy human life?" The layman—religion and philanthropy, attempts to deal with this difficulty, in fact with all difficulties attaching to all questions of character acquired through heredity by emphasizing the thought that we have only to deal with tendencies and not with the springs of character themselves. But, I assume, our profession has come to believe, almost unanimously, in the inheritance of functional characteristics, as well moral as mental and physical—in fact in the production of both body and character by heredity.

The primary data, therefore, in the study of the congenital criminal, are his ancestry; and it is of the greatest advantage in analyzing this abnormal mind that these should be traceable.

There is but little doubt, if the facts lay bare before us, and the influences disclosed which molded the character and shaped the destiny of most men who have paid the penalty of their ultimate crime with their lives, men who seem possessed of an otherwise unaccountable predisposition to destroy human life, we might have the sure revelation that during the period while their bodies were being formed a bent was being given to their characters from their birth, by their own

\* Read before the Westchester County Medical Society, held at Mount Vernon, Jan. 20, 1903.

mother contemplating the destruction of her child, and that she had imparted this disposition to do murder to the offspring. But, however far-fetched this may seem, if we find the coincidence of morality, civic virtues and sane minds with the healthy mental condition of a strong line of ancestry, and at the same time congenital abnormalities just as certainly coincident with morbid mental conditions in the ancestral line may we not rationally conclude that irregularities of mental development are due to inherited morbidity, just as the mental phenomena of idiots mark that mentally deprived type?

My own observations, which have been practically unlimited along lines of information connected with the male offender, have led me to believe, in the last few years, that criminal character depends in the first instance on heredity. Of course in this, as well as all other statements made of this subject, let us ever remember that they are probably not absolutely accurate, but are mostly approximate to the truth. But in the generality of this conclusion I am satisfied to be at one with the greatest names of our profession as well as the deepest thinkers of all ages.

"We may," says Huxley, "veritably say this moral and intellectual essence of man does pass over from one fleshy tabernacle to another. In the newborn infant the character of the stock lies latent; and the *ego* is a bundle of potentialities."

Dr. Hill of Cambridge says: "I am glad Dr. Schofield believes in the inheritance of habit. . . . We need no longer try to settle the much-discussed question of whether acquired characters are transmissible by looking out for cases in which gross anatomical changes are inherited by children not brought about by their parents' tract, but we may assert with confidence that the central nervous system tends to be transmitted to their offspring."

"Inheritance," says Furneaux Jordan, "mainly determines whether a man shall be capable or incapable, brave or cowardly, trustful or suspicious, prudent or reckless, voluble or taciturn."

It was Carlyle who said, with the intuition of genius, "Parentage imposes certain definite limitations, and two fools never can and never will produce a wise child;" and, I think, if in addition the four grandparents are fools, the statement will always hold good. So the born criminal is the product, mind and body, of the forces of heredity. Not only his body, but his mind is deeply impressed with the character of the parentage. And few indeed are the criminals who come to our prison at Sing Sing with minds that were at birth *tabula rasa*, whose mental powers at birth were not already thickly sown with seeds of crime—call them definite qualities, or for the greater part at first mental tendencies; when they reach us they are surely, for the most part, anthropologically and psychologically analogies of the congenital criminal.

In order to economize time, I now ask you, once admit with me the thing of which there is an abundance of proof, that the type of a species, the

primitive type, is more clearly represented in the female than in the male, and we may proceed to argue that the typical forms of the "eternal criminal" are organized and fixed in the woman through the action of heredity and the well-known longevity of the female offender. Which would explain why our existing penal systems are powerless against crime. As compared to the longevity of the male offender that of the female is almost exaggerated, which means quite a proportionate increase in criminal progeny.

But right here lies the difficulty in the presentment of this subject. The moment we attempt to bring a spring or a motive or a tendency into action it shrinks in size. To analyze a tendency, characteristics, or motives, or even to classify them is elusive beyond comparison. Yet they are always greater than can be expressed in words. And man, nevertheless, is quite the product of his tendencies, not the tendencies of the man, though he reveals them—and thus the criminal self is usually caused, not casual, however much environment may accentuate it.

In estimating the value to be given to evidence of hereditary predisposition to criminality, the proofs will always be found unsatisfactory from a scientific point of view. The question has not been fairly worked out because of the unsystematic work in prison reports. Therefore, it is a mere matter of probability in a given case. But the physician who has his finger on the pulse of this morbid inheritance, will find it in the brain to all appearances congenitally perfect, yet which has a tendency to break down under circumstances which would not affect a person of an originally healthy mentality. And vanity, always present in the recidivist and congenital criminal, with selfishness, sensuality, impurity, self-indulgence, cowardice, "visionariness," impatience, bad temper, unstableness, recklessness, apathy, self-conceit, fickleness, waywardness, and stupidity are as constant marks of the brain organization of the born criminal, as a constitutional tendency to nervous instability established in a family is indicated in the various directions of epilepsy, hysteria, hypochondriasis, neuralgia, and certain form of paralysis, insanity, eccentricity.

I attach no special value to the list of criminal characteristics above named. It is not scientific or exhaustive, and probably no two would agree that my list is according to their way of thinking, correct. But that most of these characteristics do very frequently, though not constantly, accompany these fatal degenerations, no one of experience will have the temerity to deny. According to Galton and Ribot even genius is often hereditary, and criminality which is so fatally and progressively fruitful, certainly presents stronger evidences of transmission than the rare and nearly always incomplete heredity of genius.

The frequency of delusions in their multiform characters of degenerative characteristics indicate too that crime is a degenerative psychosis of that group to which belong the children of the inebriate, the imbecile, and the epileptic parents. Not



always, of course, but within the limits of our psychological view, so frequent as to make its observation beyond the experimental starting point.

In attempting, within these few minutes, to describe a subject with so wide a scope as has this—"the possible improvement of the human race under the existing conditions of law and sentiment," I can only hope to suggest some lines of development especially essential to a completer view of it. In other words, to put my finger on some things to be sought. And, I assume, your society would consider it quite *deplacée* for me to cite here any series of clinical researches which seem to have convinced me of the certainty that the mental condition of the criminal is modified in a constant manner by parental influences. Nearly all intellectual creations, and all discoveries of modern ontology, are the results of the slow and continuous meditations of scientific men and their predecessors; so that they form a kind of compilation, the chronology of which is not easy to follow. Therefore it is I wish to present my own views in the lines of comparative science rather than in the inventory of isolated data.

Now, however offensive or paradoxical it may seem, there is an originality, a force, and a real coherence in the very latest utterances of Galton and Booth in this matter of racial improvement, which render their views undeniably impressive. Says Mr. Galton, "In each class of society there is a strong tendency to intermarriage, which produces a material effect in the richness of brain power of the more cultured races. And it produces a still more marked effect of another kind at the lowest step of the social scale as will be painfully evident from the following extracts from the works of Mr. Booth." Mr. Galton is considering the congenital abnormals here considered by me, and he goes on to say, in the words of Mr. Booth, "The congenital criminal leads the life of a savage, with vicissitudes of extreme hardship and occasional excesses. From this class come the battered figures who slouch through the streets and play the beggar and the bully. They render no useful service; they create no wealth, more often they destroy it. They degrade whatever they touch, and as individuals are perhaps incapable of improvement." These are the barbarians, the recidivists, the men who keep our prisons teeming. And, says Mr. Booth, in sum, "It is much to be desired and to be hoped that this class may become less hereditary in its character; there appears to be no doubt that it is now hereditary to a considerable extent."

There we have a precise statement of the problem I seek to lay before you for discussion. And many who are familiar with the habits of this class do not hesitate to say "It would be an economy and a great benefit if all habitual criminals were resolutely segregated under merciful surveillance and peremptorily denied opportunities for producing offspring." It certainly would abolish a deep source of suffering and misery to a future generation, and would cause no unwarrantable hardship in this.

The natural character and faculties of human beings differ at least as widely as those of the domesticated animal—they ought to be quite as much within control. And surely the possibility of improving the race of a nation depends on the power of increasing the productivity of the best stock, and as a certain corollary decreasing the productivity of the worst. Comparative history in the light of comparative studies in religion, art, jurisprudence, and psychology, has given us a grasp to understand the idiosyncrasies of nations, but we are slow indeed to treat the doctrine of the origin of the species as a whole, its elementary hybridity, and congenital mutations, other than as a conventional science. Scientific medical men continue in untiring search for means necessary to cure and prevent diseases, yet to my knowledge no serious step has ever been taken to solve this important problem—to raise the average of healthy beings by reducing the productiveness of the undesirables.

To-day the belief is expressed in our profession, "That it is not the medical education of medical men that will bring about the greater advancement in preventive medicine, but the education of medical men along lines of dealing with well recognized facts as to the control of preventable diseases that will produce the most good."

Thus I would class crime as one of the preventable diseases. But more is wanted in the way of unbiased scientific inquiry along the many roads my suggestions have simply run over, to make it certain that the game is worth the candle. We know that in a large measure mental abnormalities, seeming mental disintegration, morbid criminality are the direct results of influences antedating the exgenitive life of the being. In the meantime in any case of mental abnormality in a child the physician usually shifts the blame on the parents, and the parents in turn on the physician, until finally, because of the utter lack of cooperation—of the parent, the physician, and society, the psychopathically disposed child really becomes mentally disintegrated and quite degenerate—it remains for the child to then form a new line of congenital degenerates, which go on increasing practically without limit.

The mental powers that youth possesses remain with him through manhood's estate, new dispositions and other faculties may of course arise and alter the balance of character, but brain cells will not proliferate after birth. The problem before us is not how to educate the entire brain given to the child, but to seek means by which the cells of the brain cortex are neither atrophied, morbid, or dead congenitally, and to recognize the fact, which no student of any branch of biology can afford to ignore, that brain disorderliness is due more to progenital influences than any other possible cause.

In conclusion, gentlemen, having thus briefly considered one of the chief causes, if not the chief cause, of all nervous and mental abnormalities, in the history of one effect—the congenital criminal, I feel that I have a right to ask you if this sketch,

which science has already drawn, is not to some extent a copy, and not a mere diagram, of the truth? And to assure you that I feel, as I am sure most of you do, that these investigations into the proximate constitution of our race, may be useful and successful, even if their ultimate nature is beyond our ken. The science of medicine, like Bunyan's hero, has often had to pass through the "Valley of Humiliation," but the specters which meet it there are not really dangerous if they are boldly faced. We may be, no doubt are, trusting to some false ideas, erroneous experiments, and evanescent theories in this medical profession, but, without making any insolent claim to being better than our fathers, we may fairly contend that, amid much that is uncertain and temporary, some of the fundamental conceptions, the roots of ideas, are so grounded on reason and fact that we cannot but regard them as an aspect of the very truth. And this question of congenital abnormalities is among the number of those certainties.

Finally, gentlemen, at the beginning of the twentieth century, it is indeed discouraging to the patriot and the physician to perceive how the mass of nervous evils, and at the same time mental and moral weaknesses and crimes, increase in the people, and how many are followed by these abnormalities from the womb to the grave. The faculties of future generations will necessarily be distributed by the laws of heredity. To the physician then belongs the direction of that great power of which we cannot doubt the existence, and from which the race is to receive such benefits, soon as we shall have as a nation learned to understand and apply it. And, to admit a free paraphrase of a great philosopher and physician, to no nation is a high standard of the human breed more necessary than to our own—the American, for we plant our stock all over the world and lay the foundation of the dispositions and capacities of future millions of the human race.

## MEDICAL PROGRESS.

### HISTOLOGY, PATHOLOGY, BACTERIOLOGY.

**Clinical Significance of the Albumoses.**—The detection and distinction of the albumoses from the other proteids found in the urine as a diagnostic aid in detecting concealed collections of pus has been made the subject of an exhaustive inquiry by T. J. YARROW, JR. (*Am. Med.*, March 21, 1903). Thus far no specific test has been devised for each of the proteids, and the reactions for albumin and the albumoses are pretty much alike. Probably the best reagent for the detection of serum albumin, serum globulin and nucleo-albumin, and for distinguishing them from the albumoses, is salicyl sulphonic acid as advocated by Roche, McWilliam, and the author. It is prepared by treating salicylic with concentrated sulphuric acid. Primary albumoses are precipitated by a saturated solution, clearing up on heating and reappearing on cooling. Deutero-albumose is precipitated when the suspected liquid is mixed with several times its bulk of ammonium sulphate. The urine should always be freed from serum albumin

and globulin, and nucleo-albumin, as the characteristic reaction of the albumoses is the clearing up of the precipitate on heating while the serum albumin is thus rendered more cloudy or turbid. (The details of the method of testing will not bear abstracting.) The necessity of examining freshly passed specimens is insisted on as albumoses may be produced by the action of putrefactive or pyogenic organisms. The origin of the albumoses found in the urine in suppurative cases is from the collection and subsequent destruction of leucocytes, so that the products of disintegration, including the albumose constituents, enter the circulation and are eliminated by the kidney. The albumoses of pus have been found by the author to be identical with those in the urine. The value of the test has been proved by the writer in the following cases. In pneumonia it indicates the stage of resolution and may guard against a "false crisis." In differentiating typhoid from malaria when other signs fail, albumoses in the urine would indicate that the stage of ulceration had been reached. It may indicate that ulceration and cavity formation had begun in pulmonary tuberculosis, as was proved by autopsy. The value is also marked in diagnosing concealed suppuration from acute inflammatory processes; as shown by its absence in acute inflammatory conditions of the ovary and its subsequent appearance when pus had formed. Suppurative processes in liver, gall-bladder, pancreas, peritoneum, may likewise be distinguished. The author cites numerous cases in which the value of the test, in a great variety of diseases, was confirmed by operation or autopsy and believes that it is in connection with other symptoms, of greater importance than the leucocyte count. In conclusion, attention is also called to the physiological albumosuria following labor and to the fact that the appearance of albumoses in the urine indicates beginning suppuration following traumatism, such as gunshot or stab-wounds of thorax and abdomen and in meningitis resulting from contusion or fracture of the skull.

**Cryoscopy.**—After discussing the work which has been done by various observers, D. S. GRIM (*Phil. Med. Jour.*, March 21, 1903) presents his own conclusions based on the examination by cryoscopic methods of numerous normal and over 400 pathological urines, the latter including the various kidney lesions, calculus, malignant tumors, diabetes, uremia, valvular and myocardial disease, blood diseases, acute exanthemata, infectious diseases, postoperative cases. He believes that cryoscopy cannot replace, but only supplement the usual urinary tests, although it is probably the most delicate test we possess in detecting and estimating the effect of therapeutic measures directed toward cardiac and kidney lesions. It permits of reasonable accuracy in diagnosing renal insufficiency and the type of renal lesion present. Uremia cannot be diagnosed from the examination of the urine alone. Cryoscopy of urine obtained by catheterization from each kidney, when supplemented by the phloridzin and methylene blue tests, forms a reliable and delicate test of a unilateral kidney lesion and of the degree of insufficiency of the affected kidney.

**Analysis of Fluid in Hydrops of the Gall-bladder.**—The examination included two cases; in one there was a congenital atresia of the cystic duct, in the other the occlusion was due to stones. T. SOLLMAN (*Am. Med.*, March 14, 1903) found that the contents consisted of a dilute solution of true mucin, of the molecular concentrations of the serum, devoid of bile acids and pigments, of ferments and of sugar. Traces of coagulable proteid may be present. No nucleo-albumin was found. The gall-stones producing the obstruction consisted essentially of cholesterol.



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## THE ORDINANCE CONCERNING DOGS.

A NEW rule affecting those who have been in the habit of allowing their canine pets to run at large has been proposed and is under discussion in New York City. Section 672 of the City Code provides that no dog shall be allowed in any public place, save he be accompanied by a competent person, who shall be required to hold the animal securely in a strong leash, not more than four feet long. This measure, however, has been indifferently obeyed, and by many, wholly ignored, until it becomes necessary to enforce it under extreme penalty, or to devise a more practicable and more likely to be adopted scheme. It is now proposed that every dog which ventures beyond the confines of his kennel shall be furnished with an efficient muzzle at his owner's expense, and that failure to comply with such a regulation will mean either the immediate confiscation of said animal by the city authorities, or the payment of a heavy fine.

It is understood that such a method will be proposed by the Society for the Prevention of Cruelty to Animals, and in explanation of the position of that body, its President writes to the *New York Times* as follows:

"The muzzling of dogs, if the muzzle is made

really effective, must of necessity cause inconvenience and even distress to the muzzled animal. In some cases this distress is so acute and the nervous excitement which it causes becomes so intolerable that I myself have personally seen a dog tear at the muzzle with such violence as to lacerate its whole face and actually tear the claws out of its own feet. On general principles, then, it is very clear that a society for the prevention of cruelty to animals must deprecate the universal muzzling of dogs unless in some cases of extreme necessity."

A muzzle properly adjusted should certainly produce little or no discomfort, and the "inconvenience" likely to result is far outweighed by the experience of the average pedestrian unfortunate enough to be bitten by a dog, mad or otherwise. The bit in the mouth of a horse is scarcely comfortable, yet it is absolutely necessary to govern his actions,—and, moreover, the horse is a useful animal as well as a pet, which is seldom the case with a dog of the New York variety.

It is rather inconceivable that any sane dog would feel inclined to think so lightly of his anatomy as to tear out his eyes or claws to relieve a nervous excitement, and this would seem to point to the fact that such a dog was already "mad," according to the popular idea.

Continuing, the letter says: "From a long-continued and extensive study we are convinced that rabies is one of the rarest of canine diseases; and we are as firmly convinced as ever that hydrophobia is even more rare."

Possibly rabies is rare enough among dogs, but the inoculation of a human being produces one of the most violent and horrible diseases to which one may care to bear witness; and it certainly was frequent enough in France to attract the attention of Pasteur, who is quite as well known for his success in treating hydrophobia as for anything else he ever did.

The President of the Society believes that if the present ordinance requiring every dog in the streets to be led by a short cord or chain were only enforced, it would be more effective than a muzzling ordinance could be.

However this may be, it seems to us that the leash is an unsafe thing to depend upon, because not every dog is willing to be led peaceably, and in case he suddenly goes mad, the owner is most likely to throw the leash to the winds and to take to his heels (especially if he has been the first victim), rather than to prevent injury and death to those who happen to be in the dog's way.

But in spite of what is believed to be right and just in settlement of the question, the communication ends thus: "Having thus stated our own position briefly but clearly, I have only to add that our society will loyally endeavor to secure the enforcement of any measures that the proper authorities may deem to be most necessary for the securing of public safety."

We can only add that the proper muzzling of dogs and the exclusion of all unmuzzled dogs will in a short time do away with rabies and its even more frightful homologue in man, hydrophobia.

#### THE CALCIUM SALTS AND URIC ACID CALCULI

SOME years ago Professor von Noorden, the distinguished German specialist on metabolism and its disorders, suggested that the employment of the calcium salts, administered in large quantities would be of the greatest practical value in the treatment of nephrolithiasis, due to the deposition of crystals of uric acid in the pelvis of the kidney. Professor von Noorden is known as a thoroughly conservative observer and yet as a scientific clinician perfectly ready to reject long-established formulas with regard to metabolism and its supposed alternatives when experience demonstrates their falsity or insufficiency. His declarations with regard to the lack of foundation for the generally accepted belief that the light meats are less irritant than the dark meats in various forms of kidney trouble and in the so-called uric acid diathesis and his recent declaration supported by clinical experience that an absolute milk diet may in certain forms of nephritis be contraindicated will be remembered as characteristic of his progressive quality of mind.

Notwithstanding his reputation, his suggestion with regard to the use of large quantities of calcium, whenever there is a tendency to the precipitation of uric acid salts in the urine, has not received the attention it deserves. Recently he has announced his results in some 21 cases in which this treatment was employed. Only two recurrences of renal colic are reported after the patients began the ingestion of the calcium salts. In one of the patients the attack that occurred, and it was the only one in the after progress of the case, came on the fourth day after the beginning of the treatment, at a time therefore when the dissolvent action of the calcium salts could scarcely be presumed to have had time to become effectual. In the second patient, with a renal attack, in the previous history there had been renal colic every

two weeks for several years. A single attack developed nearly a year after the calcium treatment was begun and there have been no attacks since, though that is now some years ago.

In the *Journal of the American Medical Association*, March 28, 1903, Dr. Alfred C. Croftan reports four cases in which after the development of renal colic as the result of the presence of uric acid calculi patients were advised to use calcium salts continually. All four of these patients were lost sight of for periods varying from two and a half to four years but have all come recently under observation again for other causes than renal colic. Not one of them has suffered from a recurrence of their renal colic during the whole intervening time, though their feeling was one of constant dread at the time that the treatment was undertaken. It would seem that a definite advance in therapeutics for a very obstinate and hitherto rather hopeless condition has been found. Certainly the method deserves to be given a thorough trial by the profession generally.

It is not always easy to decide that a uric acid calculus is present rather than any other, but certain signs at least suggest the diagnosis. Usually the presence of a uric acid calculus is accompanied by the passage of granular matter, usually known as gravel. An analysis of this material will give a definite clue as to the composition of the material. For this purpose the collected concretions should be finely powdered, as suggested by Dr. Croftan, and then a portion treated with dilute hydrochloric in a test-tube. If it dissolves with effervescence it is not a uric acid calculus and there is no further need of testing. If none of it, however, or but very little goes into solution, the residue should be treated with an excess of warm dilute hydrochloric acid. Any residue left after this test is almost sure to be uric acid for the sulphates, phosphates and oxalates of lime all go into solution under these conditions. If a small portion of the residue be dried and heated on a piece of platinum foil the presence of an odor of bitter almonds is evidence of the uric acid nature of the material. The well-known murexide test may be used to make the matter certain.

The calcium salts, especially the carbonate of calcium, which has been recommended as the most suitable for administration in these cases, may be given almost ad libitum. Von Noorden has given as high as 15 grams (230 grains) per day for months at a time and has never seen any ill effects from the treatment.

Dr. Croftan suggests the use of 15 to 20 grains three times a day until its effect is noted, when,



if deemed necessary, the amount may be increased. As is well understood, individuation is necessary for all remedies that are meant to influence metabolism for long periods. The failure of the recurrence of renal colic and the absence of the uneasiness in the lumbar region that so often accompanies the presence of a uric acid calculus is the sign that the remedy is accomplishing its purpose. At the same time it is advisable to limit the diet with regard to such things as meat and other materials that are likely to favor the presence of an excess of uric acid in the urine and to see that the patient takes an abundance of water. This last is an especially important element of therapeutics and constitutes the most effective factor in many of the much advertised natural waters.

## ECHOES AND NEWS.

### NEW YORK.

**Mount Sinai Hospital.**—The following new appointments have been made: Dr. Florian Krug, Attending Gynecologist; Dr. D. B. Delavan, Attending Laryngologist; Dr. E. Libman and Dr. Albert Kohn, Adjunct Attending Physicians; Dr. F. Leviser, Adjunct Attending Dermatologist; Dr. Martin W. Ware, Adjunct Attending Surgeon, Genito-Urinary Department.

**Work of a Throat Hospital.**—The Metropolitan Throat Hospital, at No. 351 West Thirty-fourth street, during a period of thirty years, has been the means of affording free medical assistance to a large class among the deserving poor of New York. According to its recently issued report, 27,244 individuals have been received since its foundation, and a total of more than 218,364 visits have been made to its dispensary. A considerable proportion of the cases treated are children who suffer from tonsillar and obstructive affections of the throat. The unavoidable exposures and the restricted living quarters of the poor are causes that lead easily to asthma, chronic bronchitis, and progressive deafness, as well as more obscure ailments which, unless removed, result in permanent ill-health and dependence. In the last year, 1,307 new patients have been treated in the clinics. These have been mostly drawn from the neighboring districts of the West Side, although a proportion come from considerable distances. It is expected that the number of patients from other districts will be greatly augmented as soon as the new operating-room, now in final process of construction, is completed. The old operating-room, although built on sanitary lines, was inconveniently placed at the top of the building, and was reached only by a winding and steep stairway. The new one is located with regard to availability to the wards, and will be complete in every detail of construction. Two additional rooms for the reception of throat and ear patients have also been secured.

**Lectures to State Alienists.**—Dr. Adolf Meyer, Director of the Pathological Institute of the New York State Hospitals on Ward's Island, reports to the Commission in Lunacy that he has just finished the third course of instruction to the physicians of the fourteen State hospitals. These three courses of lectures and

clinics have been given by himself and his assistants at Ward's Island during the past winter. In all sixty-one physicians belonging to the staffs of the State Hospitals at Buffalo, Utica, Gowanda, Middletown, Rochester, Ogdensburg, Poughkeepsie, Brooklyn, Central Islip, Kings Park, Matteawan, Dannemora, and New York city have attended the three sessions. The lectures and clinics related to the most recent advances in knowledge of the causes, classification, scientific examination, and treatment of cases of insanity, and the result of the work of the winter thus far has been the stimulation of medical interest and study in the various asylums to a degree never attained before. In order further to perfect the medical administration of the hospitals, the Commission in Lunacy is gradually associating staffs of consulting physicians and surgeons and distinguished specialists in the scientific conduct of the institutions.

Thus far consulting staffs have been selected and appointed at three of the State hospitals. The following is the Consulting Board of the Manhattan State Hospital, East: Drs. Austin Flint, Whitman V. White, Walter R. Gillette, Edward G. Janeway, Carlos F. MacDonald, Allan McLane Hamilton, Joseph D. Bryant, Edward D. Fisher, William H. Thompson, Bernard Sachs, William Hirsch, William C. Lusk, Pearce Bailey, W. Evelyn Porter, John L. Adams, Thomas P. Prout.

The following is the Board appointed to the Manhattan State Hospital, West: Drs. Austin Flint, Walter R. Gillette, Edward D. Fisher, Allan McLane Hamilton, Whitman V. White, Edward G. Janeway, Carlos F. MacDonald, Joseph D. Bryant, Bernard Sachs, LeRoy Broun, Pearce Bailey, Robert C. Kemp, William C. Lusk, Henry H. Whitehouse, Ward A. Holden.

The following is the new consulting staff at the State Hospital at Central Islip: Drs. William H. Ross, William B. Savage, Harold E. Hewlett, James P. Tuttle, L. Pierce Clark, Nathaniel Bowditch Potter, P. R. Turnure.

**State Hospital Graft.**—"Branded as having been introduced under a deception and solely in the interests of Gov. Odell's Newburg grocery store," says the *Swa*, "the Assembly to-day, by a party vote of 80 to 57, passed the bill desired by Gov. Odell, which completes his scheme for the centralization of the control of the State hospitals in Albany. This bill seeks to appoint a purchasing agent who shall buy each year the supplies for the State hospitals, and he is to have his office in Albany. Its passage through the Senate was unattended with any comment, for at that time it was not known what the bill sought to do. But after its passage it was discovered that it was simply another grab on the part of the Governor for more power, and the hint went broadcast that it was in the interests of the firm of J. W. Mathews & Co. No one has come forward to defend it, and the charges of what it proposes to do have not been denied. The Democrats voted solidly against the passage of the bill and declared it was not a Democratic measure, although it was introduced by a Democratic Senator. It also developed how strong a grasp the Governor has on the Lunacy Commission, for the bill was given to Lunacy Commissioner Daniel A. Lockwood of Buffalo, the Democratic member of the commission, and he had Senator Ramsperger introduce it. To-day Assemblyman Burke (Dem., Buffalo), said: 'Every member of this house knows how this bill came to be introduced by Senator Ramsperger. It was an underhanded piece of work upon the part of the State administration. In order to ward off suspicion from the bill it was handed by the Democratic member of the Lunacy Commission appointed by Gov. Odell at a salary and expenses of \$6,200, to a Democratic member of the legislature with the understand-

ing that it was only a bill to change the names of certain hospitals and almost before any one had time to consider its provisions the Republicans shoved it through the Senate. Then upon careful consideration the real intent of the bill was discovered to be hidden between the lines."

**T. Gaillard Thomas.**—At a meeting of the Medical Association of the Greater City of New York, held April 13, 1903, a committee on the death of Dr. T. Gaillard Thomas presented an elaborate sketch of the distinguished career and eminent services of Dr. Thomas. The conclusion of their report was as follows:

In the death of Dr. Theodore Gaillard Thomas this Society recognizes the loss of one of its most distinguished and most valued members. Its memory of Dr. Thomas will be of a man of keen intelligence, wide cultivation and accomplished skill; a man of purity of character, broad humanity, and strictest honor. (Signed) Henry Freeman Walker, Edwin B. Cragin, S. Beach Jones, Committee.

#### PHILADELPHIA.

**Pennsylvania Society for the Prevention of Tuberculosis.**—At the annual meeting held April 8, the President, Dr. Howard S. Anders, in his address said that the fallacy that tuberculosis is hereditary and incurable, is still prevalent. The necessity of a popular educational movement against the disease was emphasized. Dr. Anders was reelected President and Dr. A. H. Davisson was chosen Secretary.

**Appropriations for Philadelphia Hospitals.**—The Jefferson Medical College and Medico-Chirurgical hospitals have each received an appropriation of \$260,000 from the State for the purpose of erecting new buildings. The hospital of the University of Pennsylvania receives \$175,000 for maintenance and improvements, the latter including an X-ray building and outfit.

**Osteopaths Fail to Gain State Recognition.**—The bill to establish a State Board of Osteopathic examiners, and to regulate the licensing and practice of this class has been defeated in the Pennsylvania legislature.

**Dr. Warthin to Address Pathological Society.**—At the annual conversational meeting of the Pathological Society of Philadelphia, to be held April 23, the address will be delivered by Dr. Alfred Scott Warthin, of Ann Arbor. Dr. Warthin will speak upon "Hemolymph Glands."

**Health and Charities Department Created.**—A bill creating a fourth member of the Mayor's Cabinet has been passed in the shape of the establishment of the Department of Public Health and Charities. The bill provides that: "The Department of Public Health and Charities shall be under the charge of a Director and an Assistant Director, whom the Mayor shall appoint, to which department shall be confided the care, management, administration, and supervision of public health, charities, almshouses, hospitals and all similar institutions, the control or government of which is intrusted to the city. The Director of Public Health and Charities, as chief executive officer thereof shall appoint, supervise and control all the subordinate officers and employes attached to the department, and shall appoint all vaccine physicians and health inspectors; and all hospitals belonging to the municipality where provision is made for the care of contagious diseases shall be under the immediate supervision and control of the Director of Public Health and Charities."

**Recovery Following Operation for Rupture of the Liver.**—This case was reported, and the patient exhibited at the Academy of Surgery, April 6, by Dr. Thomas R. Neilson. The patient was admitted to the

Episcopal Hospital on a Saturday, with the history of having fallen from a ladder the preceding Wednesday. He fell a distance of twelve feet, and struck his right side on the edge of a pew. After the injury he walked home, was in bed the following day, but was out on the second day. He then became worse, and was finally taken to the hospital, where it was found that the upper right segment of the abdomen was tender on pressure, the remainder of the abdomen being somewhat tympanitic. There was a small amount of blood in the urine. The diagnosis of rupture of the liver was made, and the abdomen opened through the right rectus muscle. The capsule of the liver was found to be greatly distended and to contain a small opening over a laceration of the posterior border of the right lobe of the liver. A large amount of blood was evacuated, and the laceration packed with iodoform gauze, which was carried out through the primary incision, and also through a second incision made between the eleventh and twelfth ribs. This packing was left in for twelve days. No bad symptoms followed operation, and the patient left the hospital on the forty-third day. The favorable outcome is attributed by Dr. Neilson mainly to the fact that there was only a small rent in the capsule of the liver. Emphasis is also placed on the value of posterior drainage.

**Three Successful Operations for Perforation in Typhoid Fever.**—This paper was read by Dr. Richard H. Harte. The first patient was a man, aged twenty-nine years, operated on five hours after perforation in the third week of the disease. The wound was irrigated with salt solution, closed with silk sutures, and a glass drainage tube reaching into the pelvis inserted. Convalescence from operation was uneventful. On the sixty-third day empyema developed and rib resection was performed. The man was discharged on the eighty-third day. The second patient was a man, aged thirty-nine years, in bad condition from walking typhoid. The perforation was closed with silk and the diseased appendix removed. The abdomen was irrigated with salt solution, followed by equal parts of salt solution and hydrogen peroxide, and finally by salt solution. The patient had two typhoid relapses after the operation, being discharged from the hospital at the end of three months. The third patient was a child, aged thirteen years, operated upon on the forty-sixth day of the disease, there being in addition to two perforations of the ileum a gangrenous appendix with abscess formation. This wound was flushed with three solutions as in the preceding case. In all the cases the effort to finish the operation as quickly as possible was the leading idea.

**The Mortality of Operated Cases of Typhoid Perforation.**—Dr. Harte has collected 333 cases of operation of typhoid perforation, which he divides into several groups, according to the years in which they were operated upon. The mortality has been slowly decreasing, being 90 per cent. in the first series and 69 per cent. in the last. Dr. Harte has personally operated upon 13 cases with a mortality of 76 per cent. Many of these patients were in collapse when operated upon. Though the surgeon has to depend largely upon the physician for the diagnosis, as the latter sees the cases first, Dr. Harte does not agree with the common statement that physicians are slow in making the diagnosis. From his experience in these cases he thinks that the diagnostic acumen of the physicians with whom he was associated was just as clear as would have been that of his surgical colleagues. In these cases there are two conditions to be borne in mind—perforation from typhoid ulcer and perforation from appendicitis. No one can make the diagnosis between the two. The mortality must be greater in typhoid because the lesion



is not walled off as in appendicitis. One important factor in the diagnosis of a typhoid perforation is rigidity which, if persistent, demands prompt interference. If the surgeon waits until reaction from shock takes place, it will be too late in the majority of cases. Many of these patients will react, when the abdominal cavity is opened. The lateral incision is better than the median. When the peritoneum is opened the operator should examine around the head of the colon. If this is not involved carry the hand into the pelvis, and if no lesion is found there, it is safe to conclude that a mistaken diagnosis has been made. Time can sometimes be saved by two persons looking for the perforation at the same time, one for each side of the intestine. Flushing the abdomen is preferable to wiping with gauze. Drainage is imperative and gauze makes the best drain.

#### CHICAGO.

**Hydrophobia; Measures for Prevention.**—Dr. Arthur Dean Bevan read a paper on this subject before a recent meeting of the Chicago Medical Society, in which he depicted in a graphic manner a boy dying from this disease. He briefly reviewed the essential facts connected with hydrophobia, and among other things he said it is not a myth, but the most terrible and fatal of all diseases. No human being ever recovers from it after the first symptoms manifest themselves. He narrated the history of the disease in man, referring to the bite, the premonitory stage, the stage of excitement, and the stage of paralysis. Coming to the value of the prophylactic Pasteur treatment, he said that in France the value of this treatment is generally accepted, while in Germany there is still much skepticism in regard to it. In America, the Pasteur treatment has been fairly generally accepted, and the results from the Pasteur Institute in Paris appear very convincing. In the light of present knowledge, he believes it is the duty of the medical profession to recommend the Pasteur preventive inoculation in cases of bites from proven or strongly suspected rabid dogs. Can hydrophobia be prevented? Yes. It has been practically eradicated from England and parts of Germany by systematic muzzling and quarantining of dogs. Since the first of the year there have been many cases of the disease among dogs in Chicago. There is, in fact, danger of a widespread epidemic of the disease in this city, and there is an increase in the number of human victims. The existing dog laws in the city of Chicago are inefficient, and are not effectively enforced. There are to-day a large number of homeless and ownerless dogs roaming the streets, which are a menace to the really valuable dogs and to the people, and no effort is made to rid the city of this menace. He urged the enforcement of the present dog law, and at the conclusion of his paper, offered the following: "That the Chicago Medical Society, through its Board of Councillors, call the attention of the city authorities to the fact: (1) That the disease hydrophobia is prevalent in the city of Chicago; (2) that it is possible to practically eradicate the disease by proper dog laws, rigidly enforced; (3) that the Mayor and Common Council be petitioned to immediately take such steps as are necessary to accomplish this result." The resolution was adopted. The day following the reading of Dr. Bevan's paper, Mayor Harrison, realizing the great danger to which citizens are exposed from bites of rabid dogs, gave orders to the Chief of Police to enforce the dog law. This is being done.

**An Instrument for Measuring the Rate of Coagulation.**—Dr. Wm. A. Evans read a paper in which he stated that in several diseases coagulability of the blood is a point of some diagnostic, prognostic or

therapeutic import. Some of these are liver diseases, especially gall-stones, and the other conditions producing jaundice; the hemorrhagic diseases, hemophilia, purpura, scurvy, sepsis, diseases giving petechiae as phenomena, leucemia, diabetes and pregnancy. Some gall-stone cases bleed to death after operative procedure; hence a better knowledge of the coagulability of the blood, a more efficient way of gauging it, would permit of more opportune operating, and also teach us how to build up coagulability. Pregnant women are in some danger of death from bleeding. While much of this danger is due to elements other than decreased coagulability, at the same time, he asked the question, Should we not watch coagulation in pregnancy as we now watch the urine? But this will require some simple, fairly accurate method. Reference was made to the methods already employed.

Dr. Evans submitted an instrument of his own design. It consists of a small copper bucket. This bucket, when ready for use, holds 150 c.c. The dimensions are: 8 cm. high; 6 cm. in diameter; height of cell, 7 cm.; diameter of cell, 2.5 cm.; length of tube, 5.5 cm.; outside diameter of tube, .3 cm.; diameter of lumen of tubes, .025 cm.; number of tubes, 12.

The tubes have a small rubber attachment. The outside bucket is wrapped with asbestos and covered with leather. The inside of the cell is lined with felt. Small cleaning wires go with the outfit. The apparatus is made by Leitz & Co. The following is the method of use: Scrub the finger with soap and water, then with water, then rub very briskly to dry, and also to produce some local congestion. Cover the finger with the gauze or towel. Second, fill the bucket with water at 50° C. (hot tap water is 55° C.); place the tubes with rubber tubing attached in their cell. Leave this for several minutes. Empty the water from the bucket and refill with water at 50° C. Third, rub the finger briskly; remove everything that is adherent; puncture. Fourth, suck about one inch of blood into a tube, pull off the rubber, reverse the tube, and drop it in the cell. Repeat this until you have used six to twelve tubes. These tubes must be filled in one-half minute, or less. Note the time on paper. Cover the cell. In three minutes blow a tube into a small porcelain dish filled with water. Empty a tube every half minute, minute, two or three minutes, according to circumstances, until you find one from which you cannot blow the blood, or in which the blood blown into the water is clotted. Note the time at which each tube was emptied. Clean out the tubes with the wire.

In order that a technical procedure may be acceptable for daily clinical use, it is necessary that it should fulfil three requirements: (1) It must be simple in construction; (2) easy of use; (3) it must be uniform enough for purposes of comparison. As to the first, the apparatus shown is ideally simple. The tubes are more easily cleaned than those of the Thoma Zeiss counter; they offer less difficulties than the tubes of the Fleischl hemometer. To use this instrument, the speaker said it requires a little technical skill; but less than for the Fleischl hemometer and Thoma Zeiss counter. It is necessary that all the tubes be filled in half a minute or less. If a longer time is required, then the tubes should be grouped and separate entries of time for each group should be made. Quickness is the main thing to learn. The claim is not made that this is an ultimate analysis or a thing correct to the third decimal point. It is claimed that conditions are nearly enough uniform so that comparison can be made between healthy blood and diseased blood; between diseased bloods of the different kinds, and between coagulability of the same diseased blood at different times. As to

uniformity of temperature, the essayist submitted a table showing the variation in temperature. In conclusion, the author spoke of our present information as to the rate of coagulation in different diseases, quoting from Du Costa, Cabot, Parmentier and others.

**Acute Myelogenic Leucemia.**—Drs. Frank Billings and Joseph A. Capps presented a joint paper on this subject, in which they quoted a case of leucemia, which ran an acute course and terminated fatally in two months. The onset resembled an infection through the cavity of a decayed tooth, which caused necrosis of the bone. The symptoms were fever, moderate enlargement of the spleen, slight swelling of the cervical glands, hemorrhages, and rapidly progressing anemia. The blood counts gave from 540,000 to 374,000 white cells, the majority of which were myelocytes, and large mononuclear cells resembling myelocytes. The writers have found six other cases of undoubted acute myelogenic leucemia in the literature, and two probable cases. They based the diagnosis chiefly on the presence in large number of myelocytes, and on granular mononuclear cells resembling myelocytes.

There is an important difference between diphtheria and influenza, in that diphtheria is chiefly a toxemic disease, while influenza is both a toxemic and bacteriemic disease, consequently the number of complications which may follow after influenza are very much greater than those which follow after diphtheria. For instance, after diphtheria meningitis is practically an impossibility, but it is not at all uncommon after influenza. The effects, then, of the influenza bacillus may be summed up in two words, the toxemic effect and the bacteriemic effect. There should be added still another characteristic of the influenza bacillus, and that is its pyogenic nature. Cases of abscess of the cerebellum have been reported in which neither streptococci nor staphylococci could be found, but merely pure cultures of the influenza bacillus. The peripheral neuritides and psychoses were dwelt upon at length.

**Chicago's Health.**—Of the total 207 cases of the contagious diseases reported during the week, 87, or nearly one-half, were of measles, and during the first three months of the year 69 deaths were reported from this disease as against only 20 during the corresponding period of 1902. This is two and a half times as many as last year, and in proportion to population it represents an increase of very nearly one-third over the average of the previous ten years—the ten-year average rate being 0.94 and the 1903 rate being 1.22 per 10,000 of population.

Next to scarlet fever, measles is the most serious of the diseases of childhood in its after-effects upon many of those who recover. Deafness—with consequent arrested mental development—is a not uncommon result and pulmonary tuberculosis (consumption) is another.

Only less serious than measles in the after-effects and complications is whooping cough, which is also epidemic and much more fatal. Since the first of the year it has caused 129 deaths, as against 49 during the corresponding fourteen weeks of last year.

All the contagious disease germs have manifested unusual prevalence and activity since last December. There have been ten deaths from tetanus, or lock-jaw, since January, and the prevalence of rabies, or hydrophobia, has been heretofore commented on. The strict enforcement of the dog-muzzling ordinance, ordered by the mayor during the week, will undoubtedly control the present situation as to rabies, but there should be no exceptions to such enforcement.

#### GENERAL.

**Medical College for Women in China.**—The first medical college for women in China has recently been

opened at Canton. The pupils now number thirteen, and sixty young Chinese women are preparing for entrance next year.

**Seventh International Congress of Otologists.**—This Congress will be held at Bordeaux, August 1 to 4, 1903. Dr. Moure will preside.

**The Effect of Blue Light.**—Dr. Minine, Director of the Nicholas Hospital at St. Petersburg, has discovered that the blue rays of light have the power to allay pain. He made practical application of the discovery in a surgical operation, in which the blue rays of electric light were projected upon the area treated. The operation lasted twenty minutes; and though the patient was not anesthetized, no pain was experienced.

**Thirteenth Congress of Alienists and Neurologists of France and French-Speaking Countries.**—This Congress will open in Brussels, August 1, 1903. The program will include: (1) Subjects assigned at the Grenoble Congress, 1902: (a) Psychiatry: Catatonia and Stupor, Dr. Claus (of Anvers); (b) Neurology: Histology of General Paralysis, Dr. Klippel (of Paris); (c) Therapeutics: Treatment of Agitation and Insomnia in Nervous and Mental Diseases, Dr. Trenel (of Saint Yon). (2) Various papers, demonstrations, etc.

**Army Suicides.**—A French student has been investigating the subject of suicides in the armies of Europe, and has reached some curious results. Everywhere, except in Russia, the number of military suicides is decreasing; in that country, however, the average for some years past has been 133 in every 100,000. In France the proportion now is 18 in 100,000; in Italy, 24; in Germany, 36, and in Austria, 105 to every 100,000. In civil life in this country the Germans provide the largest proportion of suicides; it is curious to find them surpassed in Europe by the Austrian and Russian soldiers. The different arms of the services commit suicide in differing proportions. In the French Army self-murder is commonest among the men of the Foreign Legion, of whom 99 in 100,000 commit it yearly, and least common among those of the Garde Républicaine, only 14 of whom kill themselves to each 100,000. The French cavalry provides more suicides than does the infantry, the infantry more than the artillery, and the engineers the smallest number. In the British Army the suicide rate is about 23 to the 100,000 at home and 30 per 100,000 in India. In 1898-99 the rate in our regular army was about 47 per 100,000; it is lower now, the strain of war conditions having lessened.

**Trips from New Orleans.**—Among the large number of attractions that are being arranged for the entertainment of the members of the American Medical Association and their friends, at the meeting in New Orleans May 5 to 8, is an excursion from New Orleans through the Sugar Cane, Rice and Oil fields of Louisiana and Texas to the historic, quaint and beautiful city of San Antonio, where the old Alamo, "the Shrine of Texas" liberty is preserved by the State, and contains many valuable relics of the Lone Star Republic; at the exceedingly low rate of \$17 for the round trip. This includes railroad fare, and berth in an up-to-date Pullman car, and the exclusive use of the same for three days, the length of the trip; there never has been such an excellent opportunity offered before to see Texas under such advantageous circumstances. Just think, three days of recreation and pleasure in Pullman palace cars, with elegant dining cars attached so that you can have your meals served at your pleasure. The itinerary of the trip will be about as follows: A few hours' stop at Beaumont, Texas, to visit the wonderful "Spindle Top Heights," the greatest oil field in the world; and a few hours in Houston, Texas, where the local profession and citizens of that city will welcome the vis-



itors and show them the interesting features of this city. A night run from there to San Antonio, where they will leave the cars at the Hot Sulphur Baths, and after breakfast every member of the party will be complimented with a hot sulphur bath, and then the Missions, the Parks, and Fort Sam Houston, one of the largest and finest Forts in the United States, will be visited; in the evening a Mexican supper will be served at the beautiful "San Pedro Springs Park," after that the start on the return trip will be made, stopping for a few hours the next day at Crowley, Louisiana, the home of the great Gulf Rice Industry, and a daylight ride from there through the beautiful Cane Fields of Louisiana to New Orleans. All those desiring to take advantage of this delightful opportunity to visit Texas and see the Alamo will please notify Dr. J. M. Head, San Antonio, Texas, who has the matter in hand, as it will be necessary for as many as five hundred to make this trip in order to get the above very low rate.

A special party will be conducted through Mexico, stopping at the principal points of interest to the City of Mexico, by a gentleman thoroughly conversant with the history of the country and the Spanish language, for \$35 for the round trip from New Orleans and return, if as many as one hundred will make the trip. This is an opportunity that should not be missed to visit our sister republic with its quaint customs and people, its beautiful scenery and historic interests, the home of the earliest civilization or semi-civilization of the American Continent.

**Anthrax in Louisiana.**—A serious condition of affairs prevails at Prairie Nammou in Acadia parish, due to an epidemic of anthrax. About 225 head of stock have died. The small farmers, ignorant of the virulence of the disease, skinned some of the dead animals and sold the skins. As a consequence there are thirteen human beings sick with anthrax.

**Charity Supervisors Outline Plans for Hardesty Farm, Maryland.**—The supervisors of City Charities, at their regular meeting at Bayview last week, appointed Dr. Henry D. Purdum resident physician to the insane department for the year beginning May 1. Dr. Purdum has been acting as resident physician for some months past. The Supervisors have examined carefully the Hardesty farm adjoining Bayview Asylum, which has just been purchased by the city, and have consulted Dr. Henry M. Hurd, Dr. William H. Welch, Dr. Fulton, Secretary of the State Board of Health, and other specialists as to improvements in the hospital service at Bayview now made possible. The plan, they say, is to put up on the Hardesty farm a small hospital for the consumptive patients now in Bayview Asylum, and for such others as may come under the immediate care of the Supervisors.

**For Mountain Tuberculosis Hospital.**—Plans are being made by the trustees of the Hospital for Consumptives (the Eudowood Sanatorium), at Towson, Maryland, for the extension of the usefulness of that institution by the establishment of a branch of the hospital at some place to be selected in the Blue Ridge Mountains. The Quarter Club, which was organized a year ago for the purpose of raising a fund for the establishment of a mountain sanatorium for the treatment of consumption, has been invited to cooperate in the movement and to consolidate with the hospital organization. Though final action has not yet been taken by the club, the plan has met with general approval, and it is expected that the union will be effected.

**New York Insane.**—Dr. Frederick Peterson, of New York, last week delivered an address before an audience of physicians at the quarters of the Medical and Chirurgical Society, Baltimore, his subject being

"State Care of the Insane." He described conditions under which insane people were treated 20 years ago in New York and contrasted them with those of to-day, graphically describing the progress that had been made. He spoke of the training schools for nurses, the electric instruments and ambulances and the improvement in the moral conditions, and described the methods used in the management of great State hospitals of the Empire State, subjecting the system of caring for the insane which is now firmly established to a detailed and exhaustive analysis.

**New Jersey State Medical Examiners.**—The State Board of Medical Examiners of New Jersey has secured amendments to the Medical Practice Act of that State by which the academic standards for admission to the State examinations have been raised from a competent school education to a diploma issued after four years of study in a normal, manual training or high school of the first grade in that State, or its equivalent. The medical requirements have been increased from three to four courses of medical lectures of at least seven months each, in different calendar years, prior to receiving the degree of Doctor of Medicine. The amendments go into effect on July 4 next. After that date, candidates for examination or for endorsement of a license issued by a recognized Examining Board of another State, will be obliged to comply with the new standard of requirements for a New Jersey license.

**Increase in Cancer in Ireland.**—The report of the Registrar General for Ireland on the prevalence and distribution of cancer shows that there has been a steady increase in the disease in that country. The number of deaths in Ireland in 1871 from that cause was 32 per 100,000 of the population; during 1891, 46 per 100,000; and during 1901, 65 for the same approximate figures. In England and Wales the death rate between 1871 and 1900 rose from 42 to 83 per 100,000, and in Scotland from 44 to 80. The returns from Bavaria, Holland, Norway, Austria and Prussia show a distinct increase in the death rate for the ten years ending in 1900. The returns from the United States tell the same story, but the percentage in that country goes up much more slowly. In Ireland the County Kerry suffers the least, the deaths being less than 30 per 100,000. The West of Ireland generally, comes next. The strip of country from Londonderry to Dublin averages from 70 to 90 per 100,000. The Carlow-Loughall district exceeds 160 per 100,000, as does also the Crossmaglen district in the extreme southwest. No explanation can be found for the physical features on the geography, except, possibly, the damp climate and the cold, clayey soil. The Registrar points out certain facts, which have been substantiated by the information he has collected. He says: "Cancer is spread or generated by unwholesome food in dwellings which are generally in an unsanitary condition. Wounds and injuries are sometimes provocative of disease, as irritation of the lips by excessive smoking; but cancer generally seems to be a constitutional disease. Where one member of a family has been affected by cancer, others often suffer with tuberculosis, and sometimes even with epilepsy, lunacy and idiocy. In many cases it is hereditary, and also to a certain extent infectious. It has been contracted through the lips by using the pipes of sufferers. More than one case has been observed to occur in different families living in the same house, or among those who go from one occupation to another, so I seem to be justified in concluding that the disease is to some extent contagious and infectious." Many English doctors are now convinced that the eating of pigs' flesh in different forms is greatly responsible for the increase of the disease, pointing out that it is

most common among the poor, whose chief meat is that of pigs, which is also the case in Ireland, while the disease is extremely rare among the Jews.

**Jonathan Hutchinson and His Fish Theory.**—Jonathan Hutchinson has returned to England after a tour of investigation in India as to the cause and prevention of leprosy, especially in reference to the hypothesis which assigns the foremost position among the causes of the disease to the use of unwholesome food. Twelve years ago the Prince of Wales's committee, which was sent to India, rejected this hypothesis, but Dr. Hutchinson's latest investigations have convinced him that the committee if it had pursued its researches more deeply would not have rejected it. Dr. Hutchinson's general conclusion is that the facts do not controvert the hypothesis, while some of them afford unsatisfactory support of it, the truth of which his inquiries in South Africa last year convinced him. Dr. Hutchinson's tour of India included visits to Colombo, Madras, Lahore, Calcutta and Bombay, where he held public meetings and discussions, and also visits to the leper asylums at Colombo, Madras, Calcutta, Purulia, Asonal, Agra, Tarntaran, Jullundur and Bombay. He visited in Ceylon all the lepers who had been fish eaters. In Madras and Calcutta each of the lepers with the single exception of a high-caste Brahmin, denied that they had ever eaten fish. In Bombay there was one doubtful exception. In Agra, Tarntaran and Jullundur there were several exceptions. Of the 500 inmates of the Purulia asylum, all had habitually eaten of fish, and many believed that this had caused the disease. Some had left off eating it on that account. The majority of those who had not eaten fish were patients who had contracted the disease in early life. In accounting for these, Dr. Hutchinson suggests "commensal communication" spreads the disease to a slight extent in a community where it has once originated, without it becoming contagious in the ordinary sense of the word. Commensal or mouth of communication, conveyed the disease by eating food directly from the hands of a leper, or otherwise receiving the bacillus by the mouth. The prevalence of the disease in the whole population of India is not greater than five in 10,000, which is about the same percentage as in Norway, but not a single district is entirely free from the disease. It is always more prevalent in or near the fishing places. In Ceylon, where the fisheries are so unproductive that the greater portion of fish consumed must be imported, the incidence of leprosy is less than two per 10,000. In Minicoy, the adjacent fish-exporting island, where the inhabitants eat fish four times a day, the percentage is 150 in 10,000. In the Bombay asylum there are 400 inmates, the majority of whom are from the great fishing district of Konkan. During eight years there have been no Jains and only one Parsee patient. The Jains are strict vegetarians. During the same period the island of Salsette, which has a population of 50,000, was the only Christian community which sent patients to the asylum. The Salsetters are all Roman Catholics who observe all fast days and the majority of them are actually engaged in the fishing trade.

**Increase in the Medical Corps of the Navy.**—The Fifty-seventh Congress in its last session provided for an increase of 150 numbers in the Medical Corps of the Navy, 25 of which are to be appointed each calendar year for six years. By the enactment of this law there is afforded to the young physicians of the country an opportunity to take service in the Navy of the United States and an assurance of the continuance of this opportunity for the next six years. The number of vacancies in this Corps occurring from retirements, resignations, and casualties average about ten a year, which,

added to the 25 created by new legislation, makes 35 appointments open to ambitious young medical men yearly.

These appointments are to be made in the grade of assistant surgeon and are within the reach of any well-qualified physician between the ages of 21 and 30 who is a citizen of the United States. Examinations to determine the fitness of candidates for appointment are held in Washington, D. C., and at Mare Island, Cal., and the boards of examiners are in continuous session throughout the year. It is not only necessary for any physician of the required age and citizenship desiring to enter the Medical Corps of the Navy to apply to the Secretary of the Navy for permission to be examined to ensure being given an opportunity. No political or other influence is required, and the only testimonials needed are those bearing on moral standing and citizenship.

The examinations to determine the fitness of candidates for these appointments are conducted in the following order: (1) physical; (2) professional; (3) collateral.

The physical examination is thorough, and the candidate is required to certify, on oath, that he is free from all mental, physical and constitutional defects. Acuteness of vision  $\frac{17}{16}$  for each eye unaided by glasses, but capable of correction by aid of lenses to  $\frac{20}{20}$  is obligatory. Color perception must be normal and the teeth good. If the candidate is found to be physically disqualified his examination is concluded. If found to be physically qualified his examination is continued as follows:

(1) Letter to the board describing in detail his general and professional education.

#### PROFESSIONAL EXAMINATION.

	Written questions.	Percentages required.
Anatomy (2) and physiology (1).....	3	80
Surgery .....	3	85
Medicine .....	3	85
Pathology (1) and microscopy (1).....	2	60
Obstetrics (1) and medical jurisprudence (1) .....	2	60
Materia medica and physiological action of drugs .....	2	80
Chemistry (2) and physics (1).....	3	60
Hygiene (1) and quarantine (1).....	2	80
General aptitude .....		80
Literary and scientific branches.....		80
Required aggregate.....		750

Bandaging; tourniquets; four operations on cadaver; clinical cases (a written report being made in one case, giving history, diagnosis, prognosis, treatment, one prescription, at least, being written out in full in Latin); urinalysis (chemical and microscopical examination of one specimen of urine); practical microscopy, and recognition of five mounted specimens (histological, pathological, and bacteriological); recognition of surgical instruments.

**Oral Examination.**—This follows the written work in each branch and the required percentage is made up from the combined results of the written and oral examinations.

The percentages given are not absolute, however, as losses in some branches may be made good in others, provided the standard is reached in the cardinal subjects of anatomy, physiology, medicine, and surgery.

**Collateral Examination.**—This embraces spelling, punctuation, the use of capital letters, grammar, arithmetic, geography (descriptive and physical), languages, history, general literature, elementary botany, geology, and zoology. While due credit is given for a knowledge



of languages and the sciences it is not essential except in the case of physics. A knowledge of the common school branches is essential, and deficiency in this respect will cause rejection even though passing marks may be gained in professional subjects.

These examinations, while necessarily thorough and comprehensive, are simple and practical, and are not beyond the attainments of any well-educated physician. The oral and written questions are similar to those asked by the best medical colleges in examination for graduation.

The future prospects of the medical officer of the Navy, both for promotion and professional opportunity, are very bright, and the plan of enlargement of the Naval establishment already adopted and authorized, as well as that in contemplation, gives assurance that this outlook will grow even more promising.

The Medical Corps of the Navy consists to-day of the following numbers and grades: One surgeon general with the rank of admiral (equivalent to brigadier general in the Army); 15 medical directors with the rank of captain (equivalent to colonel in the Army); 15 medical inspectors with the rank of commander (equivalent to lieutenant colonel in the Army); 85 surgeons with the rank of lieutenant commander (equivalent to major in the Army); 23 passed assistant surgeons with the rank of lieutenant (equivalent to captain in the Army); 56 assistant surgeons with the rank of lieutenant, junior grade (equivalent to first lieutenant in the Army), with 152 vacancies. There are 27 vacancies in the grade of assistant surgeon for the year 1903.

Assistant surgeons, after three years' service as such, will be eligible for promotion to the next higher grade—that of passed assistant surgeon—and from a study of the above table it may be observed that the small number of passed assistant surgeons insures promotion to the middle grade—that of surgeon—after a short period of service. To illustrate, the junior officer of the grade of surgeon to-day has reached this grade after less than five years' service and is in receipt of a salary of \$3,000 per annum. While this is somewhat exceptional, the prospects of promotion to this grade for the assistant surgeons now entering the service are very nearly as good.

The following is the pay table of the Medical Corps of the Navy:

	At Sea.	On Shore.	Allow- ance per Annum.*
Assistant Surgeons, rank of Lieutenant (junior grade) .....	\$1,650.00	\$1,402.50	\$288.00
Passed Assistant Surgeon, rank of			
Lieutenant .....	1,980.00	1,683.00	432.00
After five years in the service....	2,160.00	1,836.00	432.00
After ten years in the service....	2,340.00	1,989.00	432.00
Surgeons, rank of Lieutenant Commander—			
After ten years in the service....	3,250.00	2,762.50	576.00
After fifteen years in the service....	3,500.00	2,975.00	576.00
Medical Inspectors, rank of Commander—			
After fifteen years in the service....	4,000.00	3,400.00	576.00
Medical Directors, rank of Captain—			
After fifteen years in the service....	4,500.00	3,825.00	720.00
Surgeon General, rank of Rear Admiral .....	5,500.00	5,500.00	720.00

The professional opportunities afforded the officers of the Medical Corps are very good at present, and are constantly improving. The first assignment to duty of a newly appointed assistant surgeon is usually to some one of the fourteen naval hospitals, where he remains until the opening of the course at the Naval Medical School in Washington, early in October. At the naval hospitals the service is most instructive and valuable,

the larger of these institutions having a capacity of from 150 to 200 beds, and at most times carrying a full quota of patients. The Medical School is essentially a post-graduate school, designed to fit the young officer for the intelligent application of his professional knowledge to the requirements of the naval service, and to give him a training in certain specialties peculiarly important to naval work and in which he has not had the opportunity or time to perfect himself in his college course. The course of instruction comprises the following subjects—Military medicine, military surgery, tropical medicine, naval hygiene—its chemistry and biology—quarantine, the duties of medical officers, hospital corps drill and administration, ophthalmology, naval law, manual of the sword and extracts from tactics, instructions in signals. Bacteriology, blood examination and the study of animal parasites form very important branches of this course and are given in one of the most modern and fully equipped laboratories in this country. Five months is devoted to this school work, and after its completion the assistant surgeon is assigned to sea duty. Here, again his work follows the line of advanced medical and surgical procedure. He is provided with the latest and best instruments of precision and operation, and is given every encouragement to perfect himself in the practice of his profession. The most recently constructed battleships and large cruisers are equipped with hospital facilities equal to those found in most of our best organized small cities. Vessels of this type carry a crew of from 600 to 700 men, and for the care of the sick of these small villages afloat there is furnished for the medical officer a small hospital of from 20 to 30 beds, an isolation compartment, a dispensary, and an aseptic operating room. These are equipped with every modern appliance for the prevention of disease, the care of the sick and wounded, for operative procedure, and for the prosecution of scientific investigations as far as practicable aboard ship. Other duties to which naval medical officers are assigned are those pertaining to the needs of navy yards, naval stations, receiving ships, and recruiting work. Opportunity frequently occurs also for attendance of medical officers upon the meetings of medical and other scientific societies both at home and abroad as the accredited representatives of the Navy Department and the Government.

**Misuse of the Word Lorgnette.**—Dr. W. L. Pyle, in a recent issue of *American Medicine* says, "With due deference to the authority of common usage, there seems good reason for believing that the ordinary interpretation of the word lorgnette, as used in American ophthalmic practice, is not correct. The word is derived from the French *lorgner*, to spy or peep; perhaps allied to *loren* of German dialect. In all the standard French dictionaries the word *lorgnette* is distinctly defined as an opera-glass or a spyglass, while the word *lorgnon* is used to indicate an eyeglass or eyeglass mounted on a handle, or, to be more explicit, a quizzing glass. *Lorgnon à deux branches* is a double eyeglass. There is, however, the French term *lorgnette de spectacle*. Worcester defines lorgnette as an operaglass, giving Spiers as the authority. The last edition of Webster interprets lorgnette as an operaglass; *pl.* elaborate double eyeglasses. The *Century* dictionary defines lorgnette first as an operaglass, but gives a second definition as an equivalent to lorgnon. Lorgnon is described as an eyeglass or a pair of eyeglasses shutting into a frame, which, when in use, serves for a handle intended for examining objects at a little distance. This is a perfect description of the common American acceptance of the word lorgnette.

"She raises to her eyes of blue  
Her lorgnon, as she looks at you."

—*The Atlantic*, lxiii, 649.

\*Only when quarters are not furnished by the Government. Eight cents a mile is the allowance when traveling under orders.

It is also stated in the *Century* that lorgnon is sometimes used synonymously with operaglass or lorgnette. The definitions of lorgnette in the Standard dictionary are: 1. A pair of eyeglasses carried on a long ornamental handle, into which glasses shut when not in use. 2. An operaglass, especially one with a long handle. Lorgnon is made synonymous with lorgnette and is also defined as a monocle.

**Age of German University Professors.**—Dr. F. Eulenburg, privat-docent in the University of Leipzig, has published in the *Jahrbücher für Nationalökonomie und Statistik* a lengthy article dealing with the age of the active full professors in the universities of Germany as also of the German universities in Austria and Switzerland. It is practically exhaustive, only about two per cent. of the complete data being wanting, so that it covers 1,288 professors for the winter term of 1890-91, and 1,429 for the winter term of 1901-02. According to these statistics, the average age of the full university professors at present is 53.4 years, which is two years above what it was a decade ago, when it was 51½ years. The highest average age is found at the ten Prussian universities, where it is 54.5 years, and the lowest average in the three universities of Switzerland, where it is 51.8. It is significant that the smaller universities exhibit a smaller average than the larger; this is explained by the fact that usually men do not gain an entrance into the faculties of the larger until they have been tried and found approved in the smaller. In different departments the average varies considerably. In the case of the 201 theological professors it is 54.2; of the 226 law professors, 54.2; of the 295 medical professors, 54.8; of the 707 men in the several departments of the philosophical faculty, 53.1. That the average among the medical men should be the highest is readily explained by the fact that the rush to this department is especially great, and that the number of assistant professors and privat-docents is very large. On the other hand, the law faculties have not been attracting so many candidates, and the chances for earlier promotion are accordingly greater. The highest averages are reported from Berlin, Königsberg, Munich, and Leipzig; which can readily be explained in the case of the first, third, and fourth, as these leading universities are the Ultima Thule of the German savant's ambition. The youngest full professors are found in Bonn, Heidelberg, Vienna, and Strassburg, in the non-theological faculties, and in Tübingen, Marburg, Innsbruck, Erlangen, and Giessen in all departments. There are only two full professors under thirty, both in the law department, one in Tübingen, and the other in Bern. About four per cent. of the professors continue in the harness after they have passed their seventieth year, but it should be remembered that in Austria, as in the German provinces of Russia, professors are retired by law when they reach this age. Eulenburg suggests that the German states pass a law giving the incumbent of an academic chair the right to retire at the age of sixty-five with a pension, and making this compulsory, except in rare cases, at the age of seventy, but in each instance, in the latter case, making the incumbent Professor Emeritus and giving the "Lehrauftrag" to a younger man. This, he declares, would be justice to both students and professors. His discussion has an added interest when compared with the paper published in 1876 by Laspeyres on the same subject.

**Isolation and Contagion.**—The *Times* says editorially "The report of the Registrar General of Great Britain showing that, diphtheria is about five times as prevalent in proportion to the population as it was twenty-five years ago, and is now most prevalent in towns which have isolation hospitals, has started a con-

troversy as to whether isolation hospitals may not be a mistake, which promises to be very interesting. The apparent absurdity of the contention that because of isolation the liability to the spread of contagion is increased, is so obvious that it would seem to require some courage to deal with the facts as they are found in what are perhaps the most complete and accurate vital statistics available for study. But there are medical officers of experience in England who do not hesitate to hold and defend this view. One well-known physician of this class who has had sixteen years' experience as a public health official in a city of 50,000 inhabitants without an isolation hospital, and thirteen years in a city of 30,000 inhabitants with such an institution, gives it as the result of his experience that an isolation hospital has in no recorded instance reduced the attack rate or death rate of either scarlet fever or diphtheria. On the contrary, he insists, and seems to establish his contention by unanswerable statistics, that wherever isolation hospitals have been introduced the attack rate of scarlet fever has been doubled and that of diphtheria quadrupled. The Medical Officer for Warwickshire, reporting on the prevalence of scarlet fever in 1901, gave a table showing that in the half of his district which had isolation hospitals the attack rate was 4.2 per 1,000, while in the other half, which had none, the attack rate was only 2.6 per 1,000. The Medical Officer for Lowestoft in his annual report for 1900 says of scarlet fever in that district:

A perusal of the appended statistical tables and of the figures furnished in the isolation hospitals report cannot fail to reveal that, although the preventive measures in connection with this malady for years involved an expenditure of time and money exceeding the presumed requirements of all other notifiable diseases, we have been systematically unsuccessful in our efforts to obtain any appreciable diminution in its prevalence. We are confronted with the cold statistical fact that it is steadily increasing in prevalence, almost *pro rata* with the increased precautions and provisions for its isolation.

The Medical Officer of Dover, reporting on the persistence of scarlet fever in that district, attributes it to the creation of centers of infection, free from supervision and capable of widespread mischief, after the return of convalescents to their homes. Finally, the health authorities of Leicester report that in 1902, in consequence of the outbreak of smallpox in the scarlet fever hospital, all of the patients, 144 in number were sent home at once. They were in all stages of the disease, but not a single case of secondary infection was reported or is believed to have occurred in the homes to which these 144 patients were returned. Comparing this with the Dover experience, it would appear that sick persons are less dangerous than convalescents. However this may be, there is no doubt from the showing of the Registrar General's statistics that the diminution in the scarlet fever death rate during the past forty years has been most marked in the towns without isolation hospitals, and that the diminution began to be noticeable before the isolation hospital period.

Such facts will give the health authorities of American cities something to think about. We are inclined to believe that if American experience were available for comparison, it would not vary materially from that of Great Britain.

**To New Orleans Conventions.**—The train of the New York State Medical Association, New York to New Orleans, is rapidly being filled and every indication points toward a large attendance from the East. The trip from New York will be made upon one of the Pullman's most luxurious vestibule trains, and the country through which it will travel represents the



best section of the South. Among those booked for the train leaving New York, 4:25 P.M., May 2, via Washington, Atlanta and Montgomery, are: Dr. T. J. Acker, Croton-on-Hudson, N. Y.; Dr. William Allen, Jersey City; Dr. E. F. Brush, Mount Vernon, N. Y.; Dr. E. H. Carpenter, Oneida, N. Y.; Dr. and Mrs. Comstock, Dr. Percy Fridenberg, Dr. Jno. A. Fordyce, Dr. Geo. W. Guthrie and party, Wilkes Barre, Pa.; Dr. R. H. Gibbons, Scranton, Pa.; Dr. and Mrs. L. W. Hotchkiss, Dr. W. H. Knapp, Binghamton; Dr. and Mrs. J. G. Kerley, Dr. Johanna B. Leo, Mr. and Mrs. Elias Lester, Seneca Falls; Dr. Joseph Malone, Brooklyn, N. Y.; Dr. and Mrs. Henry O. Marcy, Boston, Mass.; Dr. Wilbur Marple, Dr. and Mrs. D. C. Moriata, Dr. and Mrs. Dodin, 1194 Wash. Ave., N. Y. City; Dr. and Mrs. C. S. Payne, Dr. Parker Syms, Dr. Geo. L. Stevens, Dr. W. R. Townsend, Dr. Chas. A. Wall, Dr. and Mrs. Robt. F. Weir, Dr. and Mrs. M. L. Rhein.

By the request of members of the New York State Medical Association and other members of the American Medical Association in the East, on Saturday, May 2, special service has been arranged to leave New York at 4:25 P.M., via Southern Railway, Washington, Atlanta and Montgomery. Trains composed exclusively of Pullman, dining, drawing, and state-room, sleeping, library, and observation cars. Those desiring Pullman reservation should send in their names as soon as possible to Dr. Frederick Holme Wiggins, President New York State Medical Association, 55 West Thirty-sixth street, New York; Dr. Wisner R. Townsend, 125 West Fifty-eighth street, New York, or to agents of the Southern Railway, 271 and 1185 Broadway; Pennsylvania Railroad office, 263 Fifth avenue. Time, New York to New Orleans, 39 hours.

**Obituary.**—Dr. Albert Wyckoff died at the American House, Belvidere, N. J., on Monday, in his fifty-third year. He had been an invalid for several months. He practised medicine for twelve years at Bristol, Penn.

Dr. William F. Smith, who for several years held the Chair of Anatomy at the College of Physicians and Surgeons of Baltimore, died Tuesday in that city of pneumonia after a short illness. Dr. Smith was prominent in medical circles. He was a professor at the College of Dental Surgery. He was a graduate of Johns Hopkins University.

Dr. Chauncey Ayres died Tuesday at his home in Stamford, Conn., from debility incident to old age. He was born in New Canaan, August 14, 1808, and was the oldest living graduate of the Yale Medical School, having been a member of the class of 1831. He was a resident of Stamford for sixty-six years.

## CORRESPONDENCE.

### TRANSACTIONS OF FOREIGN SOCIETIES.

#### French.

ACUTE LEUCEMIA OF HEMORRHAGIC FORM WITH NON-CONTRACTILE BLOOD-CLOT—ANEURISM OF THE ARCH OF THE AORTA ENCAPSULATED IN THE APEX OF THE LUNG—PRIMARY TUBERCULOSIS OF THE ENDOCARDIUM AND SPLEEN—ARTERIAL AND CAPILLARY NEVI IN DISEASES OF THE LIVER AND OF THE BILIARY PASSAGES—NORMAL BILIARY MICROBISM.

M. BEUSEAUD, at the Medical Society of the Hospitals, Feb. 13, 1902, stated that his associate, M. Hayem and himself had recently observed a woman, fifty years old, probably syphilitic, who was seized, without evident cause, with weakness and general lassitude. She did not present emaciation nor notable change in the color of the skin, nor fever, nor visceral lesions. Later on

there appeared a few digestive troubles, namely, anorexia, sour waterbrash and diarrhea, together with a slight degree of tracheobronchitis. During the last 15 days of her life there appeared fever and multiple hemorrhages beneath the skin and mucous membranes and into the viscera. She died, after having passed bloody urine for a whole week. It was not possible to make out any increase in the size of the liver or the spleen, or of the lymphatic ganglia. The whole duration of the illness was about three months. Examination of the blood during life revealed a leucemia of the lymphatic type. At the end of 24 hours the blood-clot had not contracted at all, nor had it transuded a single drop of serum. This alteration was coexistent with a notable diminution in the number of hematoblasts. It is generally admitted that hemorrhagic leucemia results from obstruction of the small vessels by white blood cells. Along with lesions of this kind it is known that there are others analogous to purpura and, in a general way, there are hemorrhages caused by toxemia. Hayem has demonstrated that the toxemia of the hemorrhagic purpura resembles that determined by the injection into the blood of one animal of the blood or serum of another animal of different species. By these injections the blood is, in a degree, deprived of the hematoblasts, just as one observes in purpura hemorrhagica. Moreover, there is produced a coagulation by a granulous precipitate of these elements. Thus, in clinical cases, where there is absence of the contractibility of the clot, associated with a diminution more or less marked in the number of hematoblasts, it appears proper to ascribe this phenomenon to a toxemia possessing the peculiarity of precipitating the hematoblasts. To the list of diseases which are accompanied by this form of toxemia, which includes purpura hemorrhagica, progressive pernicious anemia and hemorrhagic smallpox, one should add acute leucemia of the hemorrhagic form.

M. CHAUFFARD presented before the same society an Aneurism of the Arch of the Aorta, procured from a man fifty years old, syphilitic and suffering from hemoptysis for eight days prior to his admission to the hospital. The onset of these hemoptyses occurred one evening during his meal, during an attack of cough, and they continued during the following days. Physical examination of this patient revealed an arterial sclerosis. In addition to a tuberculous deposit in the chest, visible palpitation and pulsation were present in the left suprascapular region, which gave a double pulse. The pulse in the radial and temporal arteries on both sides were synchronous. Consequently a diagnosis was made of an aneurism in the last part of the arch of the aorta. A few days after admission the patient was seized with a violent hemorrhage, which proved fatal. At the autopsy there were found in the left pleural cavity large clots, weighing altogether 3 kilograms. There was, moreover, in the inferior part of the thoracic aorta, an aneurism which had not been discovered during life and another aneurism of the aorta, situated just beyond the origin of the subclavian artery, which was quite encapsulated in the lung and adherent to it. Toward the infero-external aspect of this aneurismal pocket, a rent had been made into the bronchi by the rush of blood and from this point also in the pleural cavity.

M. FERRAND exhibited, in the name of his colleague, M. RATHERY and himself, a specimen from a patient who presented an enlarged spleen and hypertrophied liver, and also signs of a mitral lesion, prior to his death. He died in a condition of profound cachexia. The autopsy revealed that there existed a primary tuberculosis of the spleen and a vegetating endocarditis. Specimens from the endocardium showed, on microscopic examination, that the lesions were tuberculous. It appears to be a probable curiosity, for up to the

present time no one has ever observed a tuberculous endocarditis unless there were present also tuberculosis of the lungs. In this woman, however, the lungs were absolutely sound. Sections taken from the spleen showed cheesy degeneration and necrosis and suggested that the spleen had been the point of infection of the patient and, thus, the cause of a secondary endocarditis of the same nature. Examination of the blood clot within the heart showed the presence of the tubercle bacilli in the blood. It appeared that the patient had had a true tuberculous septicemia.

The following subjects were discussed at the Society of Biology, at the sessions of Jan. 31, Feb. 7 and 14, 1903:

GILBERT and HERSCHER stated that it has already been demonstrated that during the diseases of the liver and biliary passages, various cutaneous angiomata exist, which, after examination, they have been able to class under two types—the arterial and the capillary angiomata. The arterial angiomata are situated chiefly on the face and hands, and are possessed of a central violaceous elevation, from which there radiate small vessels in a star-like arrangement. The capillary angiomata are found chiefly on the trunk, in the form of small red spots, surrounded by a white areola, which is scarcely visible. Only the arterial groups pulsate visibly and are capable of causing hemorrhage. Histologically, they are composed of conglomerate vessels of irregular lumen, with thinned-out walls and tumefied endothelium, somewhat globular in type, and encroaching upon the lumen of the vessels. In the intervascular cellular tissue around these tumors it is frequently possible to find deposits of pigment. The capillary angiomata are composed only of dilated capillaries. Both varieties have the same value semeiologically, because both are equally correlated with the active and latent seeds of diseases of the liver and biliary passages.

GILBERT and LIPMANN have been carrying out bacteriological study of the normal bile, especially with reference to the effect of anaerobic cultures. They secured bile during the different stages of digestion from the biliary apparatus of various animals, notably of dogs, cats, rabbits, beeves and swine. The summary of the facts they established is as follows: In the normal state the biliary passages, at least outside the liver itself, are filled with an abundant variety of all forms of bacteria belonging to the anaerobic type. This microbism extends from the opening into the intestine, up to the division of the ducts within the liver and, therefore, is present in the bile-duct and bile-bladder and in the hepatic ducts in their initial portion. Ramifications of the bile-duct within the liver, however, are sterile. The true hosts of the normal biliary passage are chiefly the anaerobic germs, *Bacillus funduliformis* and the *Bacillus perfringens*, etc. Various aerobic bacilli are constant, notably the colon bacillus and the enterococcus, but do not, as a rule, extend beyond the common bile duct. It is, therefore, possible to regard the bile-duct as a kind of tree, the various parts of which are successive soils for these microbes. The mixed infection of the aerobic and anaerobic germs is present in the inferior half of the common bile duct. Pure anaerobic infection is found in the upper half of the biliary gall-bladder, and in the primary divisions within the liver and the bile-duct, and, finally, within the liver itself the bile-passages are sterile. These new facts open a field for consideration as to the part played by these germs in the pathogenesis of various diseases in this part of the body.

M. LABBE, at the Medical Society of the Hospitals, Jan. 30, 1903, presented, in his name and that of ARMAND-DELILLE, observations concerning a baby afflicted

with hereditary syphilis. In this patient they found, at the same time, various cutaneous eruptions, fever, hyperleucocytosis, considerable hypertrophy of the liver and of the spleen. Examination of the blood showed that the red blood cells were 1,981,000, and those of the nucleated cells, 300 in a millimeter. Moreover, the hyperleucocytosis was of high degree and a special type, namely, consisting of 8 polynuclear, 32 lymphocytes, 50 mononuclear, 7 eosinophiles and 3 neutral field cells of the granular mononuclear type. Mercurial ointment rubbed into the skin, made the eruption of the skin disappear, reduced the enlargement of the spleen, and, after a time, corrected the symptoms of the blood. This observation seems to show that syphilis may possibly produce pseudoleucemia in the child.

## SOCIETY PROCEEDINGS.

### NEW YORK PATHOLOGICAL SOCIETY.

Stated Meeting, March 11, 1903.

**A Few Animal Parasites Sometimes Found in Man.**—Dr. Harlow Brooks read a paper on this subject and demonstrated specimens from cases of uncinari infection, and discussed the questions of the differences which might be observed between the European *Anchylostoma duodenale* and the American species of *Uncinaria*. One specimen was from a case of human infection in Porto Rico by the *Uncinaria americana*, the other was from a coyote which had died at the New York Zoological Park with bloody stools, emaciation, and anemia. The variety found in the coyote was probably the *Uncinaria stenocephala*. Another parasite spoken of by Dr. Brooks was the *Balanidium coli*, which he had found in the colon in cases of ulcerative dysentery in the orang. This parasite, according to the speaker, was without much doubt an occasional cause of dysentery in the human subject.

Another specimen was that of Miescher'schen Schläuche in the heart muscle of an elk.

Dr. J. C. Roper said that at the Hudson Street Hospital they had had recently two cases of infection with *Anchylostoma*. The patients were father and son. They had entered the hospital with marked anemia, 25 to 50 per cent. eosinophilia. On examination of the stools from the father *anchylostoma* were found. In the son's stools only eggs were found, until after the administration of an anthelmintic. There had been no diarrhea. During treatment they markedly improved. In both of these cases the eggs of the *Tricocephalus dispar* were also found, until after the administration of an anthelmintic. There had been no diarrhea. During treatment they markedly improved. In both of the cases the eggs of the *Tricocephalus dispar* were also found in the feces.

Dr. W. B. Noyes said that he had lately been asked to look at the feces of an Italian boy, aged sixteen years, at the Columbus Hospital. The boy had been in the hospital for some weeks. He was very anemic and had had occasional diarrhea, but had not at any time been very sick. At one time a provisional diagnosis had been made of tuberculous peritonitis. On examination the feces were found to be filled with the ova of some parasite which were apparently identical with *anchylostoma*. There were a few however which resembled the *tricocephalus*. A diagnosis of *Anchylostoma* had been made by one of the attending physicians on the strength of the anemia and the obscure intestinal lesions. The boy had been in this country for some time. Dr. Noyes said that the ova were identical in appearance with the pictures of the ova of *Anchylostoma*, and



though the history was obscure, he presumed that this had been a true case of *Anchylostoma*, though the diarrhea had not been marked and the child had not recently been in a tropical country.

Dr. A. E. Thayer asked Dr. Brooks whether there were any distinct clinical symptoms by which the disease could be recognized.

Dr. Brooks said that the clinical symptoms in the animals were rather striking. There was marked anemia and disturbed circulation. The beasts lost weight rapidly and became very weak. In human infection the diagnosis was more difficult and probably could not be made out. The important point which he wished to raise was that meat which contained these parasites was not fit for use unless thoroughly cooked.

Mr. L. B. Goldhorn said that as regarded the question of recognition it might be of interest to draw attention to the fact that the ova of *Anchylostoma* were more easily recognized than those of any other intestinal parasite. It was only necessary to set the feces aside for one or two days, when the ova would be found to undergo segmentation.

Dr. Roper said that in one case he had watched development of the ova beyond segmentation. They had had specimens of the large worm and also of the ova. The patients in these cases had come from Brazil.

Dr. Brooks said that the ova sometimes developed in the female before their discharge. Segmentation in the oviducts was rather common. He had seen this in the parasites from animals and it had also been seen in human parasites.

**A Case of *Filaria Bancrofti*.**—Dr. F. Tilden Brown said that, associated with a mistake in clinical diagnosis, he had had the good fortune, on microscopical examination following operation, to find numerous embryos, in different developmental stages, of what he took to be *Filaria Bancrofti*. Although subsequent examinations of the patient's blood had failed to show the embryos, he thought this might in part be explained by the supposition that the orchidectomy had removed all the adult female worms, if in fact more than one had been originally present. In such a circumstance, it was a question of some interest how long the immature parasites, which had already been discharged into the circulation, might be expected to persist. The microscopic slides showing numerous embryos and ova were presented as well as micro-photographs of the same made by Dr. Sondern. The history of the case in which these worms had so unexpectedly been found substantiated what had just been said by Dr. Brooks, that with the extension of the interests of this country in tropical lands we must be prepared for manifestations of new diseases resembling perhaps quite closely other diseases with which we have long been familiar. The patient, a German, thirty-four years old, who as a naturalized citizen had been in the United States Marine Service and had been stationed at Porto Rico for the past two years, had had no fever or illness of any kind. During the past two months he had first noticed an enlargement and slight tenderness of the left testis. The possibility of its being a barrier to reenlistment had led him to enter Bellevue Hospital for treatment. On examination, Dr. Brown had found a moderate enlargement of the left testis. It had been difficult to determine whether a slight but tense effusion in the tunica vaginalis was responsible for the symmetrical increase in size or not. A small nodule, the size of a marble, slightly tender, was felt where the midbody of the epididymis is apposed to the testis, which of the two organs it involved could not be determined. The lower part of the spermatic cord was larger than its fellow. This vas was also thicker but not beaded. The patient

had had no gonorrhea for ten years and never a swollen testis from this cause or from traumatism. A diagnosis was made of tuberculous epididymitis. The patient requested removal of the testis. At operation, nearly an ounce of straw-colored fluid occupied the tunica vaginalis. This sac, together with the testicle, lower third of the cord, and considerably more of the vas was removed. Palpation of the specimen now showed that the small nodule occupied, not the epididymis, but the rete testis just underlying it. On cutting into the lesion, a compact fibrous periphery was noted, and in its center yellowish-white semifluid material somewhat resembling tuberculous debris. The knife was drawn sideways over this surface. The small quantity of adherent material, Dr. Brown shortly after transferred to a couple of microscopic slides. On examining one of these, which he had stained for *Bacillus tuberculosis*, some worm-like forms were seen. The other slide had been treated with eosin glycerin and showed a number of field clusters of lumbricoids having the characteristics of *Filaria sanguinis hominis*. The larvae were distinctly granular and surrounded by the loose-fitting hyaline membrane. The immature forms were of oval shape, and intermediate forms showed the embryo coiled and doubled in a larger oval sac, while those more advanced presented the elongated and undulating shapes seen when these parasites are found in the blood. Dr. Brown concluded that in cutting into the lesion he had opened a dilated lymph vessel or space, the abiding place of an adult female filaria; the knife had probably severed this worm, perhaps in several places, and on scraping it sideways the uterine canals had been compressed and more or less emptied of their contents, in this way accounting for the great number of embryos found in different developmental stages. The testicle and its attachments had unfortunately already gone to the pathological department before Dr. Brown had discovered its unexpected and unusual nature, and by the time word was sent to Mr. Goldhorn, asking to have careful search made for the adult worm or worms the specimen had been considerably cut and placed in formalin solution. Many of the clinical features of this case were not unlike that so well presented in the *American Journal of the Medical Sciences* for November, 1900, by Drs. Howard A. Lothrop and Joseph H. Pratt, of Boston. In their case they had had the good fortune to recover seven female and two male *Filaria Bancrofti* from the lymphatics of the epididymis.

Dr. F. C. Wood demonstrated some slides of quartan malaria stained by a simple modification of the chromatin stain, using for this purpose aqueous solutions of eosin and methylene azure.

Mr. L. B. Goldhorn said that he thought it very gratifying to see that rapid chromatin stains were taking the place of the triacid stain which was still much used, and which required such thorough and lengthy fixation. This standard dye failed to show a great many phenomena in red blood corpuscles that all these chromatin dyes showed.

**Demonstration of Blood Smears from a Case of Pseudo-leucemia Infantum.**—Mr. L. B. Goldhorn showed some slides from a case of a child with an enlarged spleen whose blood he had been asked to examine. The slides showed very interesting changes in the red blood corpuscles as well as peculiar conditions of the leucocytes present. The anemia, as a glance at the smears showed, was of a very high grade. There were peculiarly degenerated red blood corpuscles instead of ordinary granular ones. The granules seen in the protoplasm of these corpuscles were identical with those seen in the blasts. A peculiar thing was that

while fifteen or twenty mitoses of blasts were rapidly found in one smear, in five or six others taken at the same time, none were found. Mr. Goldhorn had noticed this occurrence twice before; once in a case of pernicious anemia, and again in a case of Hodgkin's disease. Again, the first smears which had been taken a week before showed exquisite mitotic figures in very large red blood corpuscles; on taking blood again he had failed to find megaloblast mitoses in any of the smears. The leucocytes had been extremely interesting. There was a very marked eosinophilia though there had not been time for a differential count. A peculiar constituent of the blood were very large monocular leucocytes, the cytoplasm of many of which exhibited a strong affinity for the basic dyes. These cells were very abundant in this particular case. As regarded the leucocytes in detail, it seemed almost impossible to make a differential count because many forms seem to have left the bone marrow in an unfinished form, hence many leucocytes present could not be classified under the ordinary headings. Myelocytes were also present. From one point of view the blood resembled pernicious anemia, while from another point of view it resembled splenomyelogenous leucemia.

Dr. Eben Fosskett, in giving the history of the case described by Mr. Goldhorn, said that the patient had first come under his care through his taking up the practice of another physician, Dr. Joseph E. Messenger. Dr. Messenger had first seen the child about January 1. It had then been ailing for several months, was very anemic, and had an enlarged spleen. The abdomen was much distended and the child was in a worse condition than when examined by Mr. Goldhorn. He had had it on tonic treatment, iron largely, quinine occasionally, with intestinal antiseptics. Dr. Fosskett had first seen the case two weeks before. At that time the child was suffering from acute bronchitis. There was very marked distention of the abdomen; the liver was not enlarged. Calomel was given freely and the next day it was possible to outline the spleen. The spleen extended within one inch of the umbilicus and lower than the crest of the ilium. The child was twenty-eight months old. Its general appearance was pretty good, although it was still anemic. At the time of the report, the lungs had cleared up from the bronchitis and the temperature and pulse were normal. There were several small glands noticeable in each axilla and also in both groins. Dr. Fosskett had after one or two examinations thought that the size of the spleen had slightly decreased, but since that time it certainly had not. The edge of the spleen was very sharply defined. The liver was not enlarged but the intestinal condition was very marked. Another point of interest was that the mother of this child had had eight or nine children two of whom had died at about this age with precisely similar symptoms and history.

Dr. F. C. Wood said, in connection with Dr. Goldhorn's remarks on the irregular appearance of large numbers of mitotic figures in the blood at varying intervals, that he had had an interesting case several years ago at St. Luke's Hospital, in a man suffering from pernicious anemia. The blood taken five days before death at a time when the patient was presumably moribund showed an enormous number of mitotic figures and megaloblasts. Often two or three mitoses could be found in a single field of an oil immersion lens. In order to obtain more specimens of this unique blood, the speaker had made a large series of slides on the day following, but on examining these slides very few megaloblasts were found and no red cells in a state of mitotic division. The patient recovered from the coma in which he had been on the previous day and improved

considerably, so far as his general weakness went, but died suddenly four days later. The autopsy revealed a typical pernicious anemia with red marrow megaloblasts filling the shafts of the long bones. In this marrow were a very large number of large megaloblasts, many of them showing division figures. Such blood crises were not unknown in chlorosis, but did not seem to be frequent in pernicious anemia.

**Systemic Staphylococcus Infection.**—Dr. E. Libman read this paper, which appears elsewhere in this week's issue of the MEDICAL NEWS.

Dr. W. H. Park said he thought this report gave a feeling of confidence in the results of blood cultures when properly made since Dr. Libman had proven so many of his positive results by his findings of the same organisms after death, in the primary lesions.

Dr. P. H. Hiss asked Dr. Libman for a little more detail in regard to the scalp infection of which he had spoken, and if the abscesses were deep or superficial?

Dr. Libman said that some were deep and some superficial. They did not seem to correspond to the hair follicles. He was inclined to look upon them as being dependent upon the attempt of the skin to eliminate the bacteria. He had not introduced them so much to confirm his blood cultures, but rather as a matter of clinical interest.

Dr. Hiss said that personally he would be inclined to think that they were secondary infections due to the general systemic resistance having been lowered by the disease, and were probably not caused by the original infecting organism, but by organisms of the same species already present in the follicles.

Dr. Cyrus W. Field said that he had looked over the records at the Presbyterian Hospital of five hundred cases in which blood cultures were taken. There was one case which was very interesting. Eight tubes had been taken; four in bouillon and four in blood serum. Of these, two in blood serum and three in bouillon developed *Staphylococcus aureus*. The case had turned out to be a typical case of typhoid fever and typhoid bacilli had been isolated from the blood, showing that it was undoubtedly not a staphylococcus infection. The staphylococcus had been in the skin and had contaminated the needle, thus being introduced into the culture media. As the staphylococcus grows readily on blood serum and bouillon, Dr. Field thought he would doubt the presence of the organism unless it was found in all tubes. He thought there was a great deal of doubt as to the staphylococcus aureus being constantly found in the blood. He considered it a frequent contamination and that when it was present in cultures great care should be taken in interpreting the findings. The point raised referring to the urine had interested him very much.

Dr. Hiss said that Watson-Cheyne had been the first to call attention to this question of the excretion of *Staphylococcus aureus* through the intact kidney epithelium, and considered that the abscesses then arose from proliferation of the organisms in the tubules. The speaker had not placed very much confidence in the excretion of organisms through the intact epithelium because in the experiments to recover the organisms from the bladder contents, the chance of getting the organisms from the blood had seldom been eliminated. When due care had been taken in obtaining the urine specimen for analysis, it was his impression that organisms had seldom, if ever, been found in the urine, unless some pathological change had occurred which affected the integrity of the excreting organ.

Dr. James Ewing said that during the past year Bertelsman had reported in *Langenbeck's Archiv* a series of 100 bacteriological examinations of the blood. Out



of this hundred, 41 gave positive results. Of the 41 there had been 15 cases in which the *Staphylococcus aureus* had been found. In looking over the details of this article he had noticed results which were quite contrary to those obtained by others, especially in the large proportion of positive cultures from patients who recovered. In comparing these observations with the work of others he had decided that they required confirmation, especially in cases where the streptococcus was found in osteomyelitis, paronychia, urethral fever, and in puerperal sepsis, and yet the patients recovered. It had seemed to him that these results were contrary to those generally obtained. Dr. Libman's report seemed to give in some degree the confirmation required. He felt no doubt that Dr. Libman's cases of *Staphylococcus aureus* infection were genuine. The large number of cases encountered could be explained by the fact that he obtained his material from a very active surgical service. The scepticism manifested at the last meeting of the Society in regard to the frequency of *Staphylococcus aureus* in cases of endocarditis he had shared. He had noticed in the report just made that out of a series of 23 cases only two were found in malignant endocarditis, and he thought that Dr. Libman must have had a much larger number than two of malignant endocarditis out of 300 examinations. This did not seem to him to indicate that the *Staphylococcus aureus* had been found in a large number of cases of malignant endocarditis.

Dr. F. Tilden Brown asked what Dr. Libman's practice had been in the taking of blood. Was it to collect as much as 10 or 12 c.c. or to take lesser quantities for the initial test?

Dr. Field said that out of the 500 cases of which he had spoken only 12 had shown *Staphylococcus aureus* and but three of these were cases of malignant endocarditis.

Dr. Libman said, in regard to Dr. Hiss' remarks about the scalp lesions, that he himself had never seen the particular type under discussion in any other disease and would be glad to hear whether anyone present had seen the lesions to which he wished to draw attention in cases of osteomyelitis or any other diseases. He thought that the lesions occurred particularly in the scalp in children because of the activity of the sweat glands in that part. He said that there were four channels through which bacteria were supposed to be eliminated from the body, these being the skin, urine, bile and milk. As regarded the milk, the question was still an open one. The excretion through the bile could hardly be studied in the human being. He had introduced the details concerning the skin lesions and the urine to draw attention to two channels of excretion. He said that there was much discussion going on as to whether bacteria could be eliminated from the kidneys if the renal epithelium and vessels were normal; but clinically this point was of no importance, because by the time patients came under observation they were all apt to have decided degenerative changes in the organs.

In reply to Dr. Field's remarks, Dr. Libman said that he had been willing to report positive findings even if all the plates and cultures did not show organisms. The cases cited, he believed, proved that he was correct in this view. Furthermore, he said, he used several kinds of media in each blood culture and if he obtained organisms in only one flask or one plate it might be that it had only occurred there because he had used a particularly favorable medium in that flask or plate, and that those who used simply one of the ordinary media might easily miss the organism.

Dr. Libman said that he could hardly agree with all

the reports of Bertelsman, as he was skeptical concerning Bertelsman's reports of the *Staphylococcus albus* in the blood. Of course, it was possible that he had not sufficiently tested the organisms. He was under the impression that Bertelsman used the insufficient method for disinfecting the skin, which Schottmüller used.

As regarded Dr. Brown's question, Dr. Libman said that the amount of blood used varied from 2 c.c. up to 25 c.c.; as a rule it was 5 to 15 c.c. In several cases of plain streptococcus septicemia he had found the organism in a few drops of blood.

In conclusion he wished to draw attention to the fact that in blood culture work one must depend almost entirely upon one's own experience, as there were so many conflicting reports in the literature.

Dr. James P. Atkinson read a paper on The Period of Development, the Time of Greatest Accumulation, and the Persistence of Diphtheria Antitoxin in the Blood of a Series of One Hundred Horses. The paper appeared in the *Journal of Medical Research*, March, 1903, p. 173.

## BOOK REVIEWS.

MATERIA MEDICA, THERAPEUTICS, MEDICAL PHARMACY, PRESCRIPTION WRITING, AND MEDICAL LATIN. A Manual for Students and Practitioners. By WILLIAM SCHLEIF, Ph.G., M.D. Instructor in Pharmacy in the University of Philadelphia. Second Edition, Revised and Enlarged. Lea Brothers & Co., Philadelphia and New York.

THIS is an excellent small manual for a student of pharmacy or of medicine who would desire to review the subject of materia medica for examination purposes.

It tells in few words the main facts concerning the more important drugs, and has these systematically and easily arranged.

MANUAL OF BACTERIOLOGY. By ROBERT MUIR, M.A., M.D., F.R.C.P., and JAMES RITCHIE, M.A., M.D., B.S.C. American edition by NORMAN MACLEOD HARRIS, M.B. The Macmillan Co., New York.

THE present edition of Muir and Ritchie's Bacteriology comes to us in a very much improved form. It is a practical manual, being one of the best of the small works. While it contains little that is new, yet it presents that which is known with much judgment.

This work retains the chapter on fungi, which has been elided from the English edition, and also does full justice to the work of American scholars. The chapters on bibliography particularly presenting the work of the American laboratory.

A COURSE IN BOTANY AND PHARMACOGNOSY. By HENRY KRAMER, Ph.B., Ph.D., Professor in the Philadelphia College of Pharmacy. G. E. Stechert, New York.

THE author has compressed into one volume all the usual work in pure and applied botany studied by students of pharmacy in this country.

In the first fifty pages he treats of the elements of plant histology; in the next fifty pages the general principles of the external morphology of the different plant organs are graphically and tersely considered.

Part II deals with the subject-matter of Pharmacognosy, the first chapter containing descriptions of the crude drugs most commonly in use; the second chapter dealing with powdered drugs. In this chapter the author's well-known classification by color is reproduced.

Part III consists of a series of directions on how to stain and otherwise treat vegetable tissues in order to

bring out certain particular features. Finally, Part IV consists of 17 plates with 128 figures of the author's own drawings.

From the standpoint of the practical pharmacognosist, the book is a very excellent one, and, we believe, reflects great credit upon the author.

**THE AMERICAN TEXT-BOOK OF OBSTETRICS, FOR PRACTITIONERS AND STUDENTS.** By JAMES C. CAMMERON, M.D., E. P. DAVIS, M.D., R. L. DICKINSON, M.D., H. J. GARRIGUES, M.D., B. C. HIRST, M.D., CHAS. JEWETT, M.D., H. A. KELLEY, M.D., R. C. NORRIS, M.D., C. D. PALMER, M.D., GEO. A. PEARSALL, M.D., EDWARD REYNOLDS, M.D., HENRY SCHWARTZ, M.D., J. C. WEBSTER, M.D. Edited by RICHARD C. NORRIS, M.D., with ROBERT L. DICKINSON, M.D., as art editor. Second edition, revised. W. B. Saunders & Co., New York, Philadelphia and London.

THE first edition of the American Text-Book of Obstetrics marked an era in the manufacture of text-books in this country. It appeared at a time when there was a dearth of really excellent treatises and was of such a high-grade that it took first rank on its publication.

It is a pleasure to welcome the second edition and to note that from all points of view, illustrative as well as literary, it still occupies its preeminent position. We believe that there is no book its equal, and if anything that the reviewer can say will help to spread its merits abroad, we would most heartily say it; for there is no question but that the art and science of obstetrics is one of the most important of all the branches of medicine for the general practitioner, and there is greater need for an authoritative and carefully written work on obstetrics than in almost any other branch of the healing art.

This work in question fulfils, we believe, every indication. It is thoroughly scientific, accurate, well-written, and in its illustrative features beyond compare. We trust that the publishers will soon issue a third edition as an evidence of the appreciation on the part of the profession for such an excellent work.

**A MANUAL OF MATERIA MEDICA AND PHARMACOLOGY.** By DAVID M. R. CULBRETH, Ph.G., M.D., Professor of Botany, Materia Medica and Pharmacognosy in the Maryland College of Pharmacy; Professor of Materia Medica in Pharmacognosy in the University of Maryland Medical and Dental Schools. Third edition. Lea Brothers & Co., Philadelphia and New York.

DR. CULBRETH'S MATERIA MEDICA has now stood the practical test of use for a number of years, and in its present third edition we note a number of changes and improvements that brings it abreast of the newer work being done in the line of its subject-matter. For students of pharmacy and for beginners in medicine who would gain an accurate, and at the same time a condensed knowledge of their materia medica, we believe this volume to be one of the best published. For advanced students of medicine, however, its value is secondary. For them it should be a foundation not a finality.

We are at a loss to see why the chapters on the microscope in materia medica are included in a work of this kind, unless it is for the purpose of competing with books that have similar short summaries. This criticism holding more particularly for its use in medical schools rather than in schools of pharmacy; but even for these latter the chapter is too short and evanescent to be of real service. Apart from this, however, the

book is entitled to most hearty commendation, and the author to high praise for its uniform accuracy and well-judged compression.

**THE NURSING PROFESSION, HOW AND WHERE TO TRAIN.** Edited by Sir HENRY BURDETT, J.C.B. Fourth year. The Scientific Press, limited, London.

THIS is a very convenient reference book bearing on the different training schools for nurses throughout the world. For nurses, however, in the United States, it is very fragmentary and incomplete, and when it is borne in mind that the universal criticism of students of systems of nursing the world over is united in proclaiming the American schools as second to none, if not the best in the world, this omission is all the more striking.

**HUMAN ANATOMY.** A complete systematic treatise by various authors. Edited by HENRY MORRIS, M.A., M.D., London, F.R.C.S., England. Third edition. P. Blakiston's Son & Co., Philadelphia.

WE have already stated in the MEDICAL NEWS that Morris' Anatomy is, in our opinion, the best work in the English language on this important branch of medicine, and we see no reason to change our minds in looking over the third edition. In fact, the thorough re-writing, and reediting has brought this text-book more in accord with the best modern anatomical science. In one particular regard the book stands far ahead of its fellows dealing with the same subject-matter, and this is in the thorough treatment of the nervous system.

With the exception of the chapters on the circulatory system and the eye, the book is a new one and it well merits the high praise once given it by a leading teacher of anatomy in New York city, who called it the "bible" of modern anatomy.

The publishers have done their part in making the work attractive, and we trust that the present edition will win the success obtained by previous editions.

## BOOKS RECEIVED.

*The MEDICAL NEWS acknowledges the receipt of the following new publications. Reviews of those possessing special interest for the readers of the MEDICAL NEWS will shortly appear.*

**ANNUAL REPORT OF THE NEW YORK STATE REFORMATORY AT ELMIRA.** 1902. 8vo. Elmira.

**CHIRURGIE DER NOTFÄLLE.** By Dr. H. Kaposi. 8vo, 235 pages. J. F. Bergmann. Wiesbaden.

**DIE CHLORFORM UND ÄTHERNARKOSE IN DER PRAXIS.** By Dr. Koblanck. 8vo, 42 pages. J. F. Bergmann. Wiesbaden.

**DIE REIZUNGEN DES NERVUS SYMPATHICUS.** By Dr. W. Plonies. 8vo, 54 pages. J. F. Bergmann. Wiesbaden.

**DIE TECHNIK DER LITHOTRIPSIE.** By Dr. Felix Guyon. Translated by Dr. G. Berg. 8vo, 86 pages. Illustrated. J. F. Bergmann. Wiesbaden.

**THE MYCOLOGY OF THE MOUTH.** By Dr. K. W. Goadby. 8vo, 240 pages. Illustrated. Longmans, Green & Co. New York and London.

**PRACTICAL PHYSIOLOGY.** By Drs. Beddard, Hill, Edkins, MacLeod and Pembrey. 8vo, 495 pages. Illustrated. Edward Arnold. London.

**PHYSICAL CHEMISTRY FOR PHYSICIANS AND BIOLOGISTS.** By Dr. E. Cohen. Translated by Dr. M. H. Fischer. 12mo, 343 pages. Illustrated. Henry Holt & Co. New York.